MODERN PLASTICS

JUNE 1953

Phenolics by DUREZ

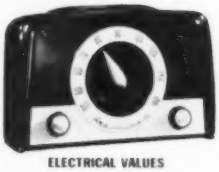
for expressing better product ideas BETTER

● When you are thinking of materials for use in new or improved products . . . or processes . . . at the least cost consistent with required performance, remember the way of electricity with Durez phenolic plastics. They get along fine together, but they never mix.

Hence their extensive use in communications equipment. Electrical current goes about its business while these non-conductive plastics go about *their* business of resisting impact and other mechanical stresses, water, heat, abrasion, and many chemicals.

Phenolics can serve you profitably in the form of resins applied to a product or an integral part of it, and as base materials molded into lustrous-surfaced parts. Molded units range in size up to the capacity of the largest presses yet made. Many molding compounds are offered with combinations of properties unavailable in any plastic materials until they were developed by Durez.

Your engineers and molding men can obtain competent help in advancing your product plans from Durez—America's largest producer of phenolics exclusively. Our 32 years of specialized experience is yours for the asking.



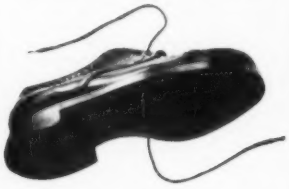
Our monthly "Durez Plastics News" will keep you informed on industry's uses of Durez. Write, on office letterhead.

DUREZ PLASTICS & CHEMICALS, INC.
1206 Walck Road, North Tonawanda, N. Y.

Member S. P. I. Committee on Large Plastics Moldings

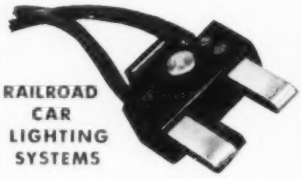
Keeping up on PHENOLIC RESINS

Now they S-T-R-E-T-C-H the life of RUBBER in



SHOE SOLES

TOOL HANDLES



RAILROAD CAR LIGHTING SYSTEMS

Not one—but a *combination* of the properties you want most in your product may be available through phenolic resins developed by Durez. In rubber—an "unlikely" field for resins until we began working with rubber men on their problems—that is what happened. The resins contribute to vulcanization of hard and semi-hard stocks of Buna-N and certain other types, increase hardness, stiffness, and resistance to abrasion, chemicals, and heat! Processing is aided, service life lengthened.

The physical, electrical, and chemical properties of phenolic resins may have unforeseen and highly profitable uses in your business too. May we help you look into them?

DUREZ
PHENOLIC RESINS
that fit the job

PHENOLIC PLASTICS THAT FIT THE JOB

"I love the pencil box in the center . . . and Oh, Johnny, just look at those pretty sharpeners and rulers!"

"Gosh, Mary . . . they sure are swell, but I go for that big, pencil space ship in the corner—It's real zippy!"

An Exciting Windowful of "Bell Ringers" molded of

Catalin Styrene by STERLING (SP)* PLASTICS

Penholders, protractors, moisteners, school kits! Eye-appealing, streamlined and practical, these school aids help to train and develop eager, young minds and fingers. Rulers, pencil sharpeners and ruler combinations with sharpeners and pencil cases ingeniously affixed! One item, we note, is fitted with a slide that actually multiplies and divides . . . automatically. 'Rithmetic thus becomes child's play!

All, are thoughtfully engineered, and molded of versatile CATALIN STYRENE in a selected choice of its brightest colors. As the basic component for school supplies, CATALIN STYRENE is scholarship material. It is carefully formulated, light in weight, uniform, clean, structurally sturdy, color-compelling and cost-favorable. Its deportment in the handling and processing cycle is exemplary . . . and worthy of star awards for good conduct at school!

**Products of Sterling Plastics Co., Union, N. J.*

CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE • NEW YORK 16, N. Y.

CATALIN

In addition to Styrene Molding Compounds, Catalin chemical products include a wide range of Urea, Phenolic, Cresylic, Resorcinol, Melamine and Styrene Resin formulations.

MODERN PLASTICS*

JUNE 1953 VOL. 30, NO. 10

CONTENTS

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Another new development using

B. F. Goodrich Chemical *raw materials*

B. F. Goodrich Chemical Company does not make this rug. We supply the Geon materials only.

Underfoot Idea becomes tops in Sales!

SOMETIMES a hot sales idea is suggested by the advantages of a material—as so often happens with Geon. Sometimes the idea comes first and only needs the right material to burst into a sales success.

Take this low-cost, all-purpose rug that housewives are buying by the thousands. It is made of Geon molded into a rope fabric pattern and is finding ready use in every workroom of the house. It is a fatigue mat for ironing or at the kitchen sink. It's a bath mat that dries instantly. It can be used on the porch and in hall ways and foyers or as an easy-to-clean front door mat. Best of all, it never has to be laundered—simply wipe it clean with a cloth and you're in business again. There are lots of other uses in boats or automobiles. Color? Nine wonderful hues to fit any color scheme!

Being made of Geon, it is scuff resistant, waterproof and non-inflammable. It is acid and grease resistant and it is skid-resistant, wet or dry.

Versatile Geon comes in readily adaptable forms—as resins, plastic granules and liquid latex. These forms may be processed by casting, dipping, coating or molding. Perhaps one of them can help you improve or develop a product, to bring in more sales. For technical information, write Dept.GB-6, B.F.Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

GEON RESINS • GOOD-RITE PLASTICIZERS . . . the ideal team to make products easier, better and more saleable

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

Beauty....

WITH ITS WORK CLOTHES ON

.....that's Chicago Molded Plastics

Beauty . . . plus genuine utility. You see it wherever you see Chicago Molded Plastics . . . in radio and TV cabinets, air conditioning units, appliance handles and housings . . . improving the eye-appeal of a product . . . setting it apart as a thing of beauty . . . and, at the same time, improving its utility and service.

Here, for example, are two parts recently molded for Mitchell Room Air Conditioners. There's no questioning the beauty of the grille, rich and lustrous in Decorator's Beige. But it's more than that. It's strong, tough, easily withstanding the handling and abuse that come with frequent adjustments. It is not affected by moisture or by the continual changes in temperature. And, with all this, its beauty never fades for the rich color is molded in . . . goes all the way through . . . can't wear off. The sleek, black condenser fan ring is molded plastics, too . . . tough . . . unaffected by the action of the condensate . . . or by temperature changes.

The beauty of molded plastics . . . their inherent qualities . . . and the methods by which they are mass-produced . . . offer advantages unequalled by any other material or method. And there are a host of products, including furniture and furniture components, where these qualities can be most effectively utilized . . . usually with worthwhile economies. Development work is necessary, of course. And that's where we can be of tremendous help. Our engineers have officiated at the birth of hundreds of now-famous plastics applications. They'll be happy to serve you in the same way . . . without obligation. And as for quantity and size, just remember . . . we have the most modern facilities for the mass-production of even the largest molded plastics parts made.

So . . . talk things over with a Chicago Molded engineer . . . soon. Just write, wire or phone . . . today . . . for prompt action.

CHICAGO MOLDED PRODUCTS CORPORATION

CUSTOM MOLDERS OF ALL *Plastics*

Member, Committee on Large Plastics Moldings, SPI

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EDITORIAL

No Economic Cushion Needed

A new spate of economic prophecy is upon us now that a peace in Korea looks possible. From the Department of Commerce, from every major bank, from independent business analysts, and from marketing counselors come press releases and brochures all asking "After defense spending, what's going to happen to business?" and all answering that question in line with the following points of argument:

(1) Defense spending is not going to stop but will taper down to a new plateau.

(2) Reductions in defense spending will undoubtedly result in a reduction of tax burdens upon individuals and businesses.

(3) Population growth will give us a market of 174 million people by 1960—almost 20 million more people than we have at present.

(4) The dollar value of output per man per hour is increasing rapidly due to improved capital equipment. This increase in productivity can almost automatically provide for an increase in purchasing power of all families and individuals.

(5) Many of the nation's needs have not yet been met. Our schools need vast extension, our highways are inadequate, our health facilities must be enlarged.

The plastics industry holds a peculiar position in this peace-time picture. In the first place, those plastics materials in greatest volume of production are not being used to any great extent for military applications. In the second place, recent and current expansion of plastics production is at a pace faster than that of almost any other material.

Market-wise, plastics will naturally benefit from the above-mentioned "cushion" factors. But the plastics industry has expanded far beyond the point of being able to look to a cushion economy for any future stability of well-being. The plastics industry will find its future markets in consumer goods and industrial components.

And just whence will expanded markets for plastics come? We think from the automotive industry, the refrigeration and home appliance industry, from air conditioning, the whole electronics field, the furniture and furnishings field, the construction industries, the farm equipment field, the office and industrial equipment field, and the transportation field.

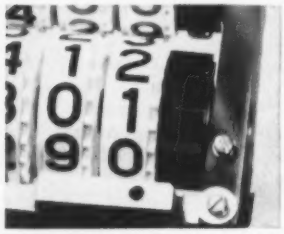
Plastics' future markets are in our opinion closely related to the changing mode of living of the people. In fact, plastics' future markets are so much bigger than plastics' past and present markets that economic cushions don't even need to be considered.

Two things, however, must be given more consideration by the plastics industry at all levels: first, the improvement of standards of quality in many lines of plastics merchandise; second, an improvement in and extension of selling techniques.

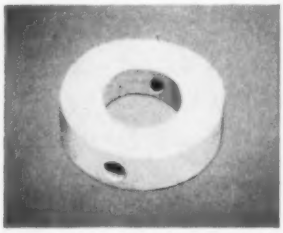
54 parts in this

NYLON STARWHEEL is molded in one piece . . . *simplifies design* . . . saves manufacturing steps.

NYLON ASSEMBLY has *excellent bearing characteristics* . . . low coefficient of friction.



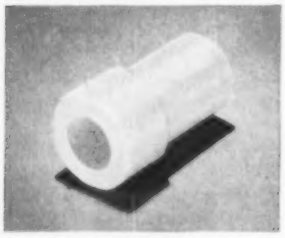
NYLON RATCHETS that control counter wheels are *lightweight*... combat inertia... guarantee accurate operation.



NYLON WHEEL is *strong, tough, dimensionally stable* . . . may be dyed for assembly identification.

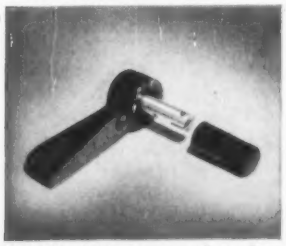
NYLON SHAFT LOCK is *molded to close tolerances* . . . finishing operations are minimized or eliminated.

NYLON CHANGE CARRIER is *virtually unbreakable*... cuts weight... gives positive action in dispensing coins.



NYLON BEARINGS *need no lubrication* after installation... operate quietly ... give long, dependable service.

NYLON SCREWS are *resilient* . . . have "self-locking" properties . . . hold settings over long periods.



NYLON KNOBS are *smooth, tough*... pleasant to the touch . . . keep their newly finished appearance.

NYLON CAM *resists wear* . . . is strong, will not chip or crack . . . needs no lubrication.

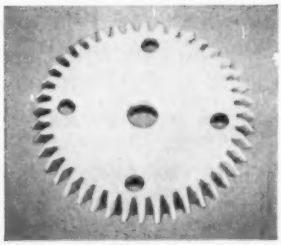
NYLON GENEVA CAMS are *strong in thin sections* . . . *unaffected by corrosion* . . . cut manufacturing costs.

# of Du Pont nylon plastic new fare collector

The Grant Electrofarer is a completely automatic fare-collection device . . . gives drivers an audible count and visible check of coin deposits. It can receive a single- or multiple-coin fare deposited in any combination of up to five coins and tokens, record the amount, then separate and drop each coin into its change carrier. It eliminates all driver fare handling except making change . . . contributes to safer, faster service.

The device incorporates 54 different parts of Du Pont nylon plastic. These parts (a few are illustrated) show how the engineering properties of Du Pont nylon can contribute to better product performance, often at less cost.

The parts were molded from Du Pont nylon by The Danielson Mfg. Co., Danielson, Conn., for Grant Money Meters Co., Providence, R. I.



NYLON GEARS can *operate continuously to 250° F.* . . . are readily molded in one operation . . . cut costs.

Du Pont nylon parts can be economically mass-produced by injection molding . . . are light in weight . . . give better performance. Nylon molding powders are available in a number of compositions, each with different properties, for mechanical, electrical and other uses. For information, write: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept., Room 306 Du Pont Bldg., Wilmington, Delaware.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Polychemicals
DEPARTMENT

PLASTICS • CHEMICALS

Improved 8 oz. "REEDS" Offer More Moldability

10D—8 oz. machine with new heater and hopper—P3477

1. Double shear link mechanism develops 275 tons mold closing pressure.
2. Larger heating cylinder plasticizes up to 100 lbs. of material per hour.
3. Newly-designed hopper accommodates standard 200 lb. material drum.
4. Exclusive "plunger advance" system speeds up machine cycles.

Reed-Prentice's improved 10D-8 oz. injection machine combines new moldability with the rugged dependability that's made this machine the real "workhorse" of the plastics industry.
Write for full details on the 8 oz. "REED".

SPECIFICATIONS 10D-8 oz.

Die locking pressure, tons	275
Rated casting area, sq. in.	125
Mold opens	10¼"
Maximum die space	16"
Size of die plates	21x25"
Weight, lbs.	13,400

4, 12, 16, 20, 24, 32 and 200 oz. "REEDS" also available.

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

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Some plastics talk tough . . .

Acetate is tough!

ONLY ACETATE OFFERS YOU THE COMBINATION OF TOUGHNESS WITH SHATTER RESISTANCE . . . CLEAR-THROUGH-COLOR WITH LASTING LUSTRE . . . MACHINEABILITY . . . AND *TRUE* ECONOMY!

Cracked, jagged edges . . . peeled paint . . . dented surfaces DON'T SELL TOYS!

Counter damage . . . customer returns . . . breakage in assembly and shipping damage DON'T SPELL PROFITS!

That's why toy manufacturers and toy buyers like acetate—the plastic that puts a toy in the quality class without taking it out of the competitive price bracket.

Before you produce a toy . . . before you place your toy order, check on all the advantages and economies acetate plastic has to offer. Celanese, the headquarters for acetate, is the place to go for information and assistance. Write: Celanese Corporation of America, Plastics Division, Dept. 101-F, 290 Ferry Street, Newark 5, New Jersey.

Canadian affiliate, Canadian Chemical & Cellulose Company, Ltd., Montreal and Toronto.

Celanese *

*Reg. U.S. Pat. Off.

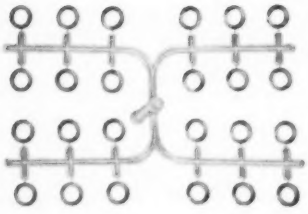
TOUGH ACETATE PLASTICS

Precision

TV TUNER COMPONENT—Compression molded of alkyd for excellent electrical characteristics, low moisture absorption and dimensional stability. The alkyd has a short cure time . . . sets up fast . . . has the advantage of a short molding cycle with resulting economy of fewer cavities per mold and lower tooling costs.

Strength

SHIELD FOR CLOCK RADIO—Compression molded in general purpose phenolic. Wall has sufficient strength not only to protect the mechanism from damage, but to guard against electrical shock.



Uniformity

BATTERY SEALING GROMMETS—Injection molded of polyethylene. Tolerances were critical to insure finished parts that would give complete seals on every battery. The thin section of the grommet made it unusually difficult to hold the tolerances . . . finished parts had to be completely free of flash.

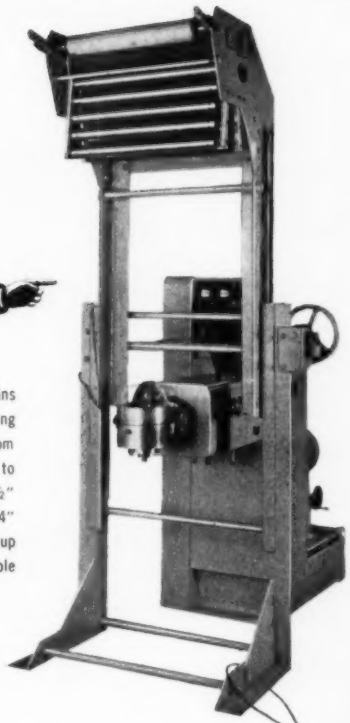
Precision Molded By MALLORY PLASTICS

These components are typical of the results you can get from Mallory Plastics' complete design, mold making and production facilities. Our engineers are well qualified to help you select the right material for the job . . . engineer and build precision molds . . . maintain production schedules that will match yours. Mallory Plastics' facilities include injection, transfer and compression molding equipment in a wide range of machine capacities. For complete information, write or call us today.

P. R. MALLORY PLASTICS, INC.
3670 MILWAUKEE AVE. • CHICAGO 41, ILLINOIS

A subsidiary of P.R. MALLORY & CO. Inc. MALLORY

MPM teaches you how to operate this machine



MPM "Packaged Unit" contains everything needed for extruding vinyl and polyethylene tubing from 3" to 14" wide, from .001" to .010" thick. Shown are our 1½" extruder, tubular film die, and 24" combination pinch roll and takeup unit. Larger units are available for tubing up to 48" wide.

Set yourself up in the plastic packaging film business with this mpm "Packaged Unit"

Expanding consumption of vinyl and polyethylene flattened tubing means that every pound extruded can be sold at a substantial profit. And with the MPM setup shown here, you can be producing these marketable plastic films soon after the simple installation of equipment has been completed and we instruct you and your employees in its operation.

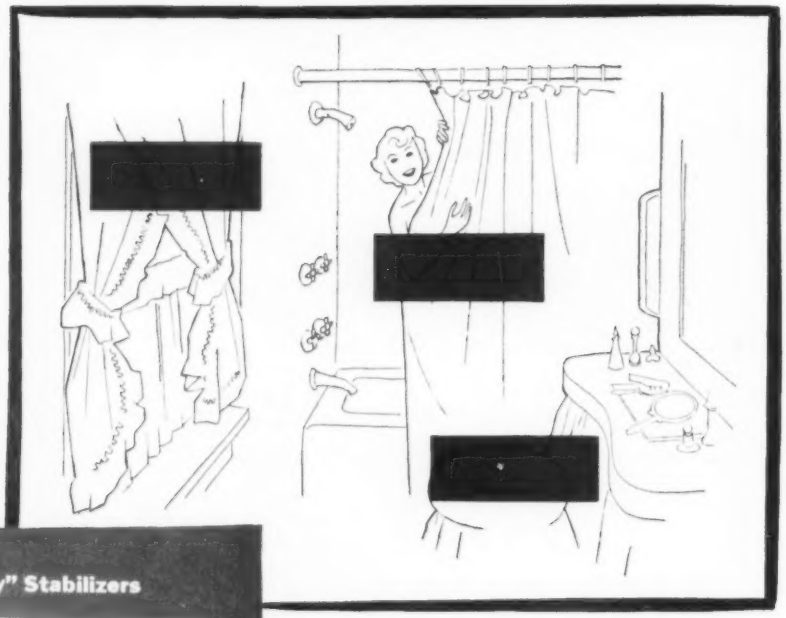
For complete details on an MPM "Packaged Unit" that will put you in this growing business, drop us a letter without delay.

Modern Plastic Machinery Corp. is one of the leading manufacturers of high capacity, precision extruding equipment. Our units are in use throughout the world.

modern plastic machinery corp. mpm

15 Union St., Lodi, N. J., U. S. A.
Cable Address: MODPLASEX

[West Coast Representative]
4113 W. Jefferson St., Los Angeles 16, Calif.



"Dutch Boy" Stabilizers

PRODUCT	USE
TRIBASE (Tribasic Lead Sulphate)	Electrical and other compounds requiring high heat stability
TRIBASE E (Basic Lead Silicate Sulphate Complex)	Low volume cost insulation
DS-207 (Dibasic Lead Stearate)	Stabilizer-lubricant for sheeting, film, extrusion and molded compounds
PLUMB-O-SIL A (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored sheeting and upholstery stocks
PLUMB-O-SIL B (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored film, sheeting, belting
[redacted]	Highly translucent film and sheeting
DYTHAL (Dibasic Lead Phthalate)	General purpose stabilizer for heat and light. Good electrical properties
DYPHOS (Dibasic Lead Phosphite)	Outstanding for heat and light in all opaque stocks, including plastisols and organosols. Exceptional weathering characteristics
NORMASAL (Normal Lead Salicylate)	As stabilizer or co-stabilizer in vinyl flooring and other compounds requiring good light stability
BARINAC (Barium Ricinoleate)	Stabilizer-lubricant for clears

Dutch Boy®

CHEMICALS *

*Reg. U. S. Pat. Off.

NATIONAL LEAD COMPANY

111 Broadway • New York 6, N. Y.

In Canada: **CANADIAN TITANIUM PIGMENTS LIMITED**

630 Dorchester Street, West • Montreal

For brightly colored... highly translucent vinyls...

stabilize your film and sheeting with "Dutch Boy" Plumb-O-Sil C

When you stabilize your vinyls with "Dutch Boy" Plumb-O-Sil C, you can be sure of two things.

1 – You'll get film and sheeting with good color – good, clear color. Plumb-O-Sil C does not affect the color because it has no appreciable tinting strength. It gives you excellent stability in deep shades and vivid colors. And it performs well with most dyes and pigment additions.

2 – You'll get highly translucent film stock. Plumb-O-Sil C's refractive index closely coincides with that of vinyl chloride resin.

In addition to these product advantages, you'll also find "Dutch Boy" Plumb-O-Sil C gives heat stability and requires no predispersion.

For additional information, including technical data on Plumb-O-Sil C, just write. And if you have a special problem in stabilizing your vinyls, consult our technical staff for assistance.

MORE PLASTICIZING...
FASTER SPEEDS
with the NEW

WATSON-STILLMAN PE-64 INJECTION MOLDING MACHINE

SPECIFICATIONS

CLAMPING CAPACITY .....425 Tons

DIE SPACE .....25" x 45"

PLASTICIZING CAPACITY...200 lbs. per hr.

INJECTION SPEED .....185" per min.

The new Watson-Stillman PE-64 Injection Molder is the nearest thing to a machine that actually *makes* money...in its ability to produce a wide variety of plastics items—faster, more economically, and with minimum upkeep.

Here's clamping capacity to spare—425 tons of it...with a plasticizing capacity of 200 pounds per hour! Thanks to the W-S preplasticizer with which it comes equipped, this production giant can show its heels even to machines of larger nominal capacity.

Now nearing a decade of proved efficiency, W-S preplasticizers have hung up one record after another both as original equipment and as conversion units on W-S machines.

Start figuring this outstanding producer in your profit picture. See a W-S representative, or write for full particulars. You'll be glad you did.

W-S HYDRAULIC

ESTABLISHED 1840

PREPLASTICIZER CONVERSION UNITS...
for your W-S Injection Molding Machines...now available from STOCK...subject to prior sale.
Write for details today.

THE WATSON-STILLMAN COMPANY

DIVISION OF H. K. PORTER COMPANY, INC.

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W-S "Completeline" Hydraulics ... The Shortest Distance From Production to Profits

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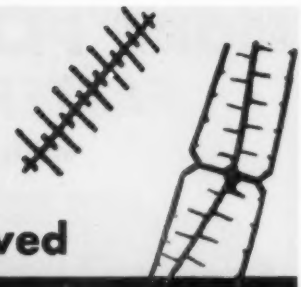
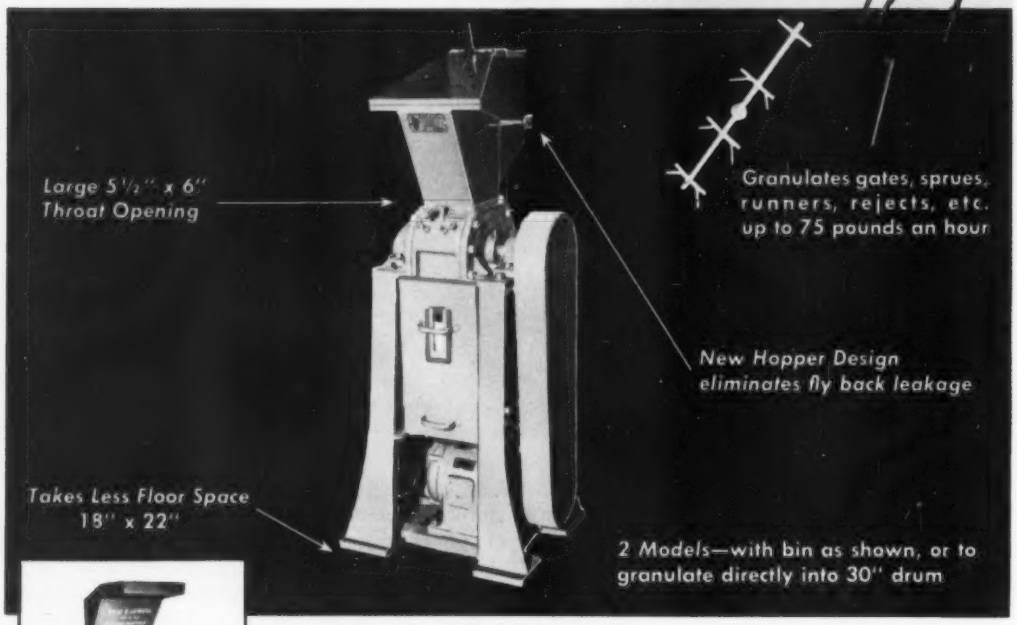
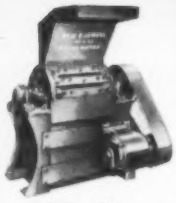
NEW MIDGET GRANULATOR

FOR BESIDE-THE-PRESS GRINDING

Now Redesigned and Improved

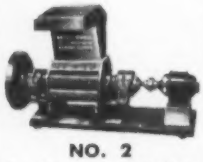






NO. ½

Medium size machine. Capacity up to 500 lbs. per hour. 7½ or 10 H.P. motor.



NO. 2

For heavy-duty grinding. Capacity up to 1800 lbs. per hour. 40, 50 or 60 H.P. motor.

Has Molder-Recommended Features...

Comparison proves the new B&J Midget Granulator offers more advantages, feature for feature. This new design was dictated by many molders throughout the country to answer every requirement.

The new B&J Midget takes the absolute minimum of floor space—18" x 22" — an important essential with space at a premium.

The large size throat will easily handle gates, sprues, runners, etc., from ⅛" to ½" sectional thickness.

All parts of the Midget are easily accessible—hopper, screen, and chute or bin are quickly removed for cleaning. Standard screen furnished to meet your granule size requirements. Available with or without casters for portability. And, the B&J Midget is sturdily built for long, trouble-free operation.

There's a B&J grinder for every need. Tell us your requirements or send samples of your material for grinding in our testing laboratory. Also write for brochure describing the complete B&J line.

REMEMBER! B&J GRINDERS ARE BUILT TO LAST LONGER!

BALL & JEWELL, INC.

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Hold your answer! We've got three more questions. Can your part be moulded by thermosetting methods? Can it be moulded with standard thermosetting materials or newer materials like Teflon, Alkyd or glass-reinforced plastics? Do you need quick deliveries in production quantities? Three "yes" answers, and your part problem's solved. We're custom moulders for *any* thermosetting job—with complete moulding facilities, including design and mould making. Phone or write *your* questions to Dayton or your local branch office.

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FOR OVER 36 YEARS PLANNERS AND MOULDERS IN PLASTICS

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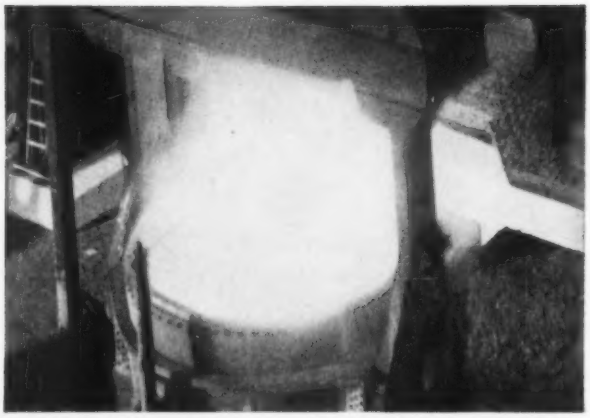
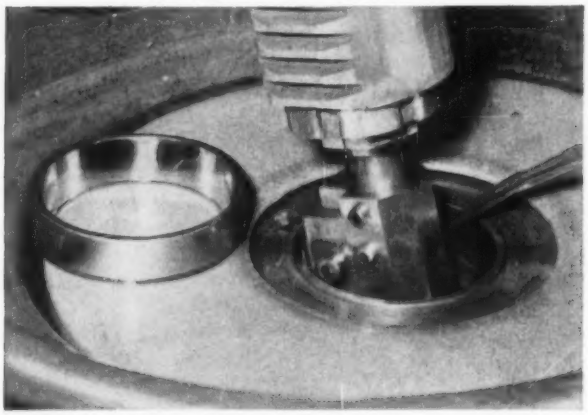


WE MAKE OUR OWN STEEL to insure top quality from start to finish. The special grade alloy steels which give Timken bearings their strength and resistance to wear are made in our own steel mills.

TO FINISH...



FINISHED TO CLOSER TOLERANCES. Finishing of rollers and races to incredible smoothness accounts for the precision performance of Timken tapered roller bearings.

TIMKEN® bearings give you more for your money than any other bearing

TIMKEN® bearings are the only bearings that give you all these advantages: advanced design, precision manufacture, rigid quality control, special analysis Timken steels. That's why you should be sure that the tapered roller bearings you use are Timken bearings. Always look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

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NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL AND THRUST ◁▷ LOADS OR ANY COMBINATION

...It's a one-piece molding of **PLEXIGLAS**

New Servel "Automatic Ice-Maker" gas and electric refrigerators feature handles that can be operated by wrist or elbow. Colorful handle-facings, 7½" x 4" x 1½", are molded of PLEXIGLAS V-100.

The handsome face of this refrigerator handle is not an assembly of separate parts. The raised edges, the sides, lettering, markings, and background areas are all part of the same single molding—of PLEXIGLAS acrylic plastic.

The molding is transparent—metallized and spray painted on the rear surface to produce the brilliant chrome bezel effect, the mirrored and richly colored backgrounds, the gleaming letters and decorations.

In addition to eye-catching appearance, the part has excellent serviceability. Because it is molded of PLEXIGLAS, its crystal clarity does not change with age . . . and it has the strength and stability to withstand hard knocks, sudden shocks, moisture, and constant handling.

The chances are that parts molded of PLEXIGLAS can add durable sales appeal to the product *you* are designing or manufacturing, too. We will be glad to tell you how this acrylic plastic, so widely used in many fields, can meet your specific requirements.

This booklet, "PLEXIGLAS Molding Powders", describes the properties and advantages of PLEXIGLAS and shows how it is being used for molded parts and extruded sections in outdoor and indoor applications. Write to the Plastics Department for it today. You will receive it promptly.

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Representatives in principal foreign countries

PLEXIGLAS molding powders are listed in Sweet's Product Design File, Section 1c/Ro.
PLEXIGLAS is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries
Canadian Distributor: Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada

anywhere in this solar system

Colorful Spaceman equipment is an absolute must among the small fry. Every child in the neighborhood solar system is in urgent need of interplanetary flight equipment to prepare for imminent solar activity. Toy stores feature plastic helmets, weapons and flight aids in brilliant eye-appealing colors.

TITANOX titanium dioxide white pigments contribute brightness, brilliance and opacity to these fast-selling plastic items, and to the grown-up products as well. TITANOX pigments are applicable to any type of plastic, although special TITANOX pigments may be required to secure certain desirable properties. Consult the Technical Service Department for assistance in obtaining the maximum benefit from titanium dioxide pigmentation. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

TITANOX®
makes plastics brighter

®TITANOX
the brightest name in pigments

TITANIUM PIGMENT CORPORATION
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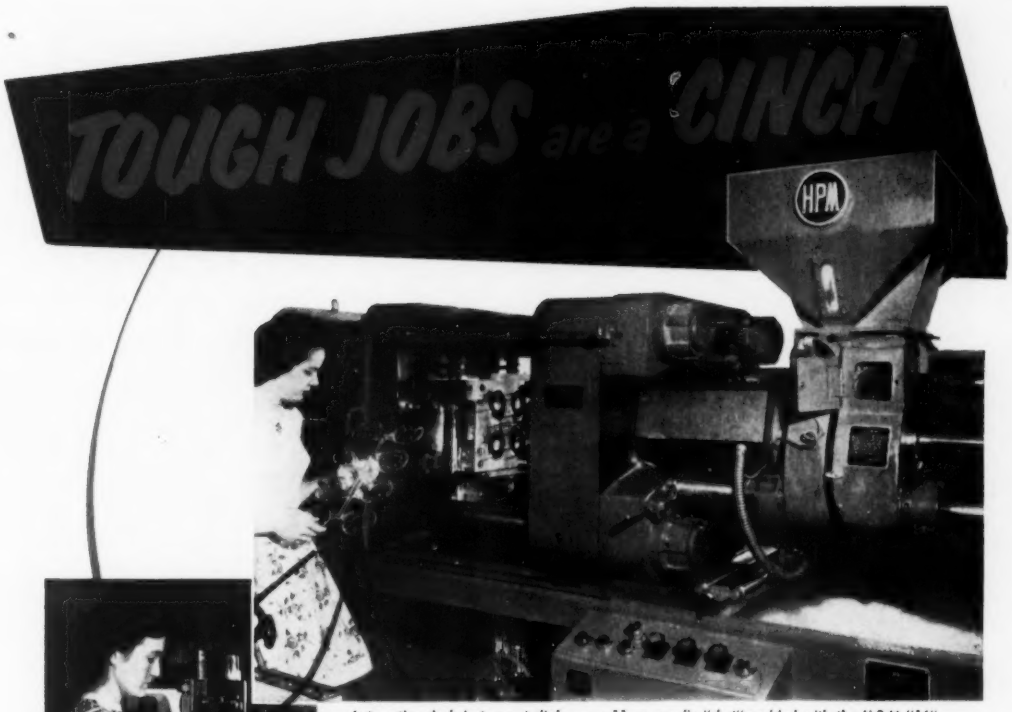

Automotive dash instrument dials . . . an 11-oz. acrylic "shot" molded with the H-P-M "16".

Gibson refrigerator door shelf molded of impact polystyrene . . . a 12-oz. "shot" . . . a real challenge to the H-P-M "16".

with the H-P-M 16 oz!

Bolta-Carpart*, on their large automotive and refrigerator jobs, proved that the H-P-M 16 oz. can "knock out" production on big parts. They really push their H-P-M "16's" to the limit and like it!

The new H-P-M "16" has all the features you've been looking for — direct acting hydraulic clamp for quick mold set-up . . . improved feeding mechanism . . . faster plasticizing chamber . . . plenty of mold mounting space with long stroke available for deep parts. H-P-M pumps, valves and piping are mounted on the outside of the machine for easy accessibility.

When it comes to turning out quality parts of big area . . . complicated section . . . shallow or deep draw . . . the new H-P-M 16 oz. can't be beat. Just ask any molder who owns one! Write today for details.

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HPM

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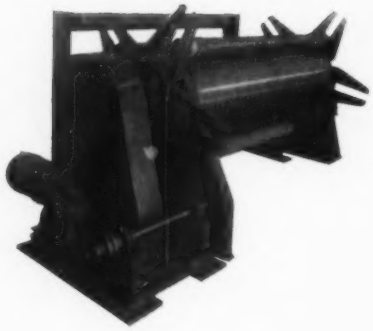
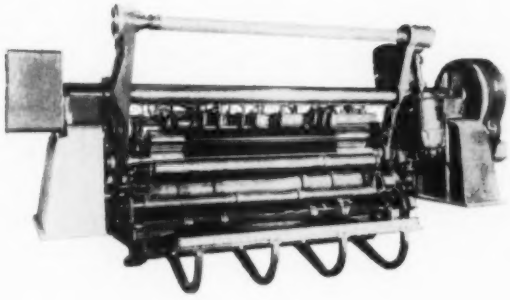
Presses For Every Pressure Processing Application

"Ferristart" Surface Winder for film and sheeting with manual continuous starts on new cores. Convenient to operate, convenient to remove finished rolls for packaging. Applicable at speeds up to 75 yards per minute.



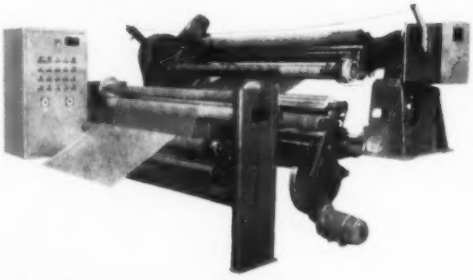
PLASTIC WINDERS

Continuous surface or center winder for film and sheeting for a wide range of gages, tensions, speeds, widths and roll diameters.



Fully automatic Model 40-S center wind for sheeting. Square even starts without adhesive on the core. Full tension control. Slit webs can be wound side by side.

Fully automatic Model 40-F center wind for film at speeds up to 150 yards per minute. Even starts without fold back. Full tension control thru a range of 6# total minimum to 45# maximum on full width web.



THE BLACK-CLAWSON COMPANY
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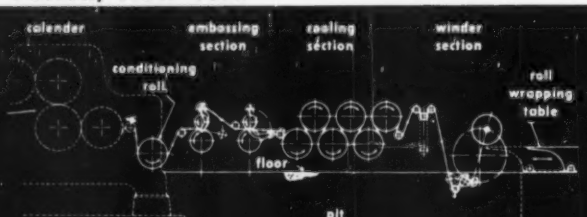
Dilts



Cooling Drums
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COMPLETE PLASTIC TAKE-OFFS

the SERVEL WONDERBAR molded by General American

General American's molding equipment ranges from 2000 ton compression presses to 300 oz. injection presses—a great help in producing the nine plastic parts of the Wonderbar.

2 refrigerators in every home... a history-making merchandising idea!

Who'd have thought, a year or so ago, that the public would be buying *two* refrigerators . . . an extra one for the living room, den or office? Servel's Wonderbar—with phenolic cabinet and high-impact polystyrene lining by General American—created this vast new market. From the day it was introduced, the Wonderbar has been a huge and continuing sales success.

To sell the Wonderbar, Servel needed a product with the looks of fine furniture, the performance of a fine refrigerator. At General American they found the answer . . . men who understand plastics, facilities and equipment *unduplicated* in the industry. Engineering, die-making and equipment for injection, compression and reinforced plastics—it's all here.

Why not find out what General American can do for you on product-development problems? To know more about our start-to-finish service, write for our new brochure today.

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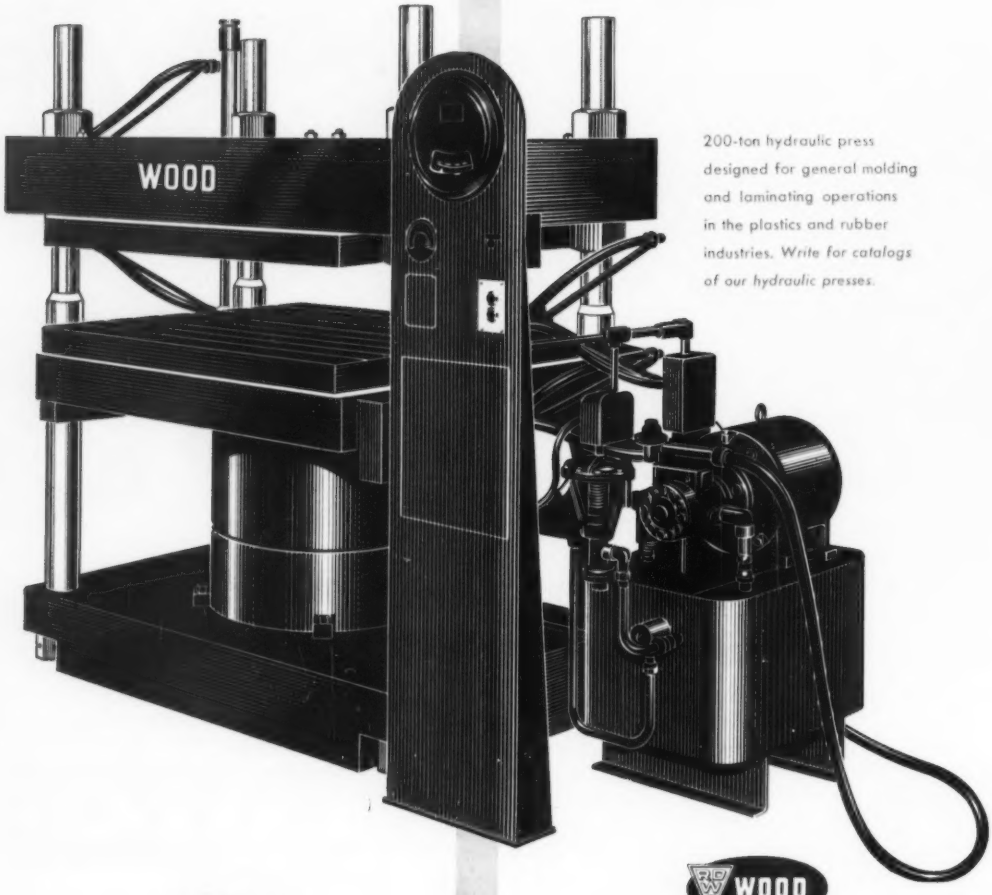

200-ton hydraulic press designed for general molding and laminating operations in the plastics and rubber industries. *Write for catalogs of our hydraulic presses.*

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You will find—as many vinyl processors have already discovered—that you get less scrap, more re-usable trim, tailings and ends when you turn to PLIOVIC G90V—Goodyear's new polyvinyl chloride resin.

That's because PLIOVIC G90V has outstanding heat stability—giving less degradation and loss of physical properties when reworked. It also permits high calender speeds and fast extrusions that mean more production.

PLIOVIC G90V has a high uniform bulk density for ease in handling—good color for use in clear or pigmented compounds—and can easily be compounded for use in a wide range of products.

First in a series of polyvinyl chloride resins, PLIOVIC G90V is another use-proved product by Goodyear. Write for full details today to:

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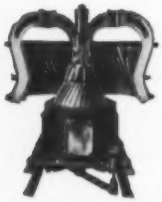
DOES THE JOB FAST!

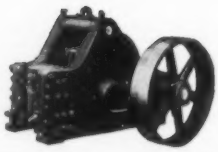
Whether you grind soft or hard materials, there is a Sturtevant Grinder or crusher exactly suited to your requirements.

Tough and rugged, Sturtevant Equipment has the built-in stamina to stand up under continuous operation. Most of this equipment has the "open door" accessibility which makes cleaning easy.

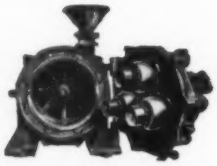
Look into Sturtevant Grinders and crushers for your applications. These machines will give you the exact mesh you want . . . cut your costs by increasing production. Write for catalog today.



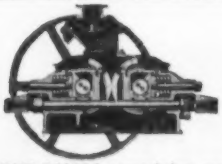
ROTARY FINE CRUSHERS for intermediate and fine reduction (down to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.



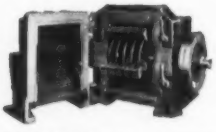
JAW CRUSHERS for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



RING-ROLL MILLS for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operated in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



CRUSHING ROLLS for granulation, coarse or fine, hard or soft materials. Automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8 x 5 to 38 x 20. The standard for abrasives.



SWING-SLEDGE MILLS for coarse and medium reduction (down to 20 mesh). Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

MOTO-VIBRO SCREENS screen anything screenable. Classified vibrations. Unit construction—any capacity. Open door accessibility. Open and closed models with or without feeders. Many types and sizes—range of work ½" to 60 mesh.

STURTEVANT MILL COMPANY

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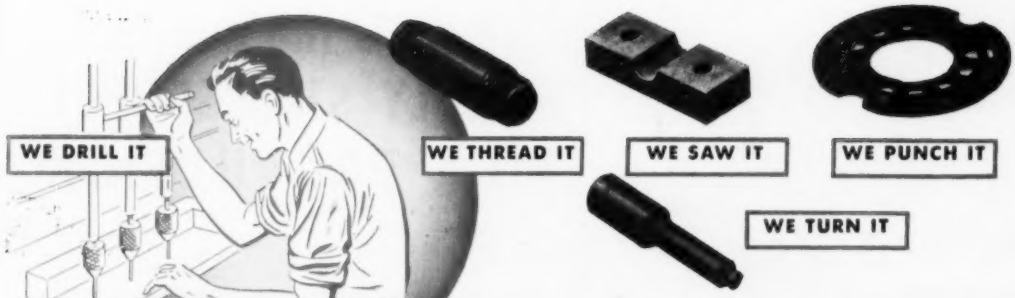

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Products in the Spaulding line display a unique array of electrical, mechanical and chemical property combinations which give them almost unlimited versatility.

Machinability, for instance, may be obtained in combination with one or more of the following properties: electrical insulation, arc resistance, deionizing properties, structural strength, resistance to wear and abrasion, good forming, light weight and chemical inertness.

This versatility accounts for the fact that the parts we fabricate from Spaulding basic materials are found in everything from washing machines to welding equipment, from radios to railroad cars.

To find out how Spaulding products may contribute greater efficiency to your own product without extra cost, or do the same or a more efficient job at lower cost, mail the coupon for the Spaulding handbook or consult your nearest Branch Sales Office.

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Here's the key to REALLY SUCCESSFUL FILM PRODUCTION

This diagram shows a matched production unit, developed by Farrel-Birmingham engineers for processing plastic film and coatings. It consists of two 3A Banbury* mixers, two 22" x 60" mills, a 28" x 66" 4-roll "Z" calender, cooling drums and windup. The speed of the calender is adjusted to absorb the 3,000 pounds per hour output of the two Banbury mixers to provide an even and continuous flow of production.

*Trade mark of Farrel-Birmingham Co., Inc.

When Farrel-Birmingham developed the "Z" calender, production of plastic film took a giant step forward. The reason: *finer control of gauge.*

This machine, with its unique roll arrangement, positive roll positioning, flexible and extremely sensitive roll adjustment, and precise temperature control, has actually brought the production of calendered film and sheet to new levels of accuracy, quality, and speed.

Light, unsupported films are being commercially produced on the "Z" calender down to thicknesses of .002" and less, with gauge tolerances held within plus or minus .0001". Employing the crossed-axes device on the final pass, this accuracy can be maintained over a considerable range of light films.

Using this same device, comparable accuracy in the production of heavier films and sheet is possible over as wide a gauge range as .004" to .020".

Send for more information about this revolutionary development — the "Z" calender. Or, if you prefer, a Farrel-Birmingham engineer will be glad to discuss your film production problems with you.

FARREL-BIRMINGHAM COMPANY, INC.
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Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
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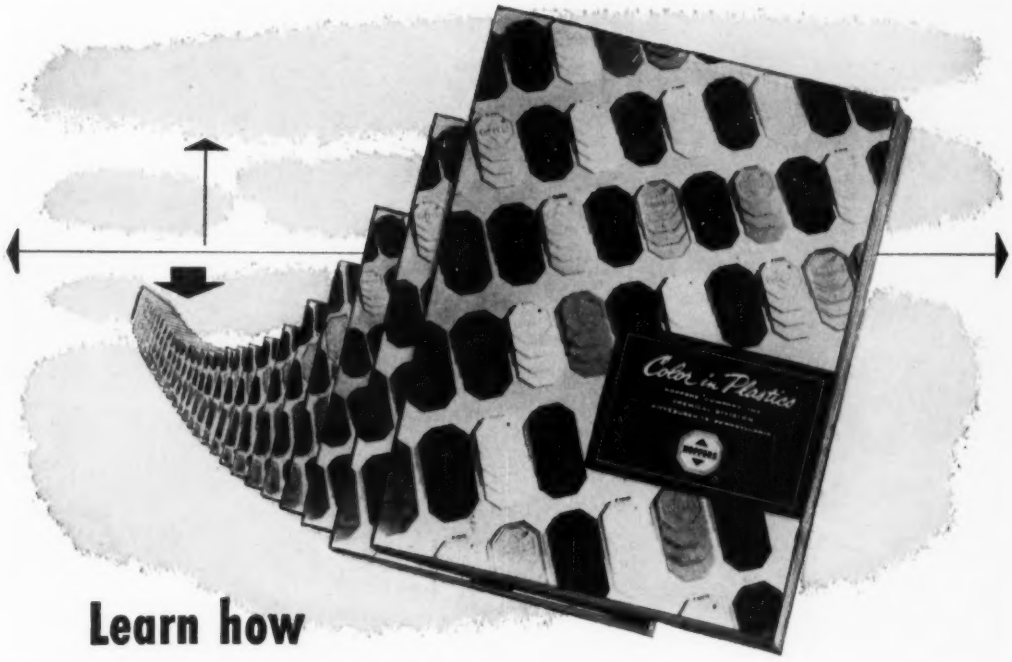

Learn how Koppers controls polystyrene's fourth dimension — *Color!*

COLOR is polystyrene's fourth dimension . . . with Koppers polystyrene you can specify the color of your plastic product with the same exactness with which you determine its length, width and thickness.

To help you take full advantage of the most salable feature of polystyrene, Koppers has published a full color book entitled "Color in Plastics." This unique book explains why Koppers polystyrene is visually identical in color from one lot to another over any period of time. This means you are assured of uniform colors in each similar product from first to last; and in products which are molded in two or more parts and then assembled into complete units, you can expect a uniform color match in the several sections.

Most important of all, it means that Koppers can match perfectly any shade of color you are using. If you can see it, we can match it!

For more details about Koppers unique system of color matching, and an authoritative discussion of the Science of Color, write today for your free copy of "Color in Plastics."

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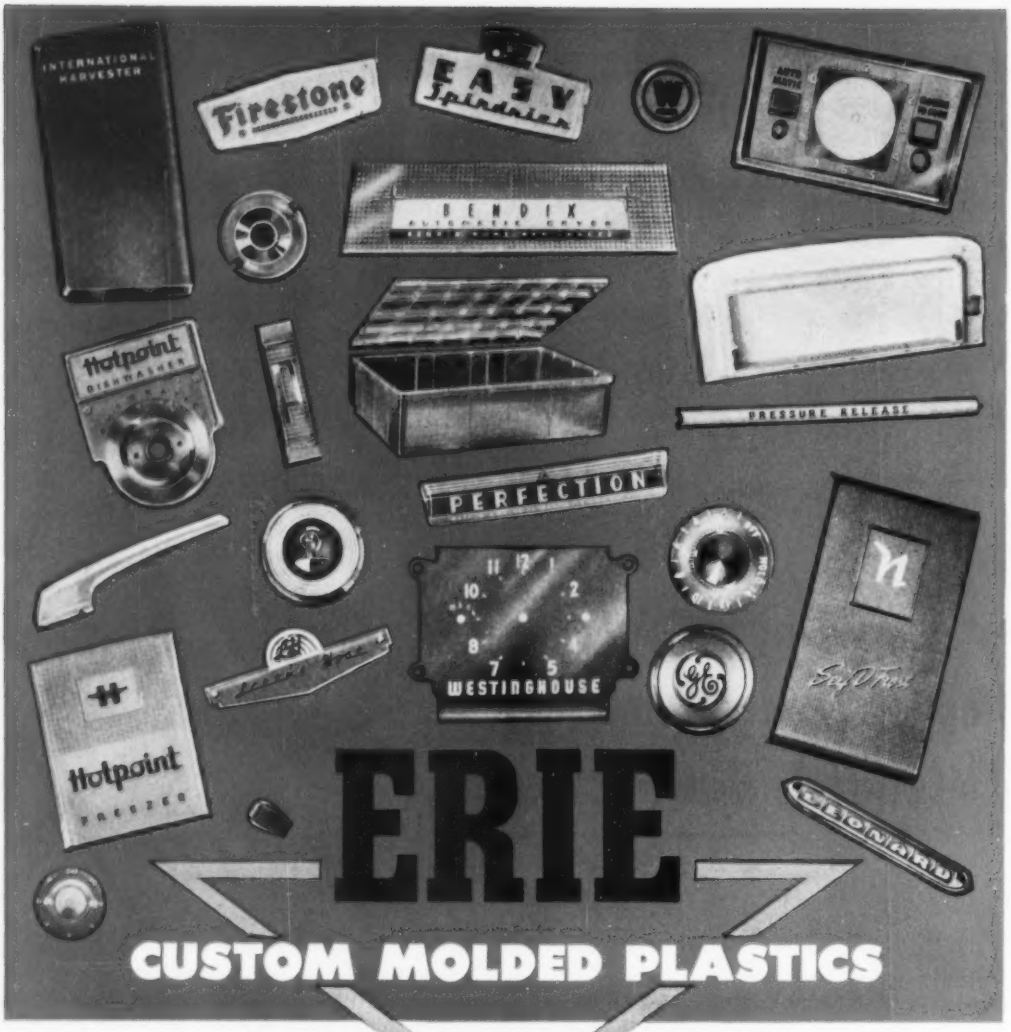

for Electrical Appliances

Electrical appliances cover a wide range of domestic utility products . . . and Erie covers just as wide a range in custom molded plastic components. Whether it's a three dimensional plate that will at once identify your product and distinguish it—a hidden part upon whose perfect functioning depends the performance of the machine—a conspicuous knob or control which should combine utility with beauty—you will find an appreciation of your problems and an unusual ability in helping to solve them, when you come to Erie for injection molded parts.

Write for your copy of bulletin, "Who We Are . . . What We Do in Plastics."

25th Anniversary
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PLASTICS MOLDING MACHINE...

FEATURING 200-TON

Hydra-Lock CLAMP!

Outstanding new LEWIS "6" plastics injection molding machine provides the speed, economy, silent operation and compact construction of a lightweight model . . . yet handles a wide range of parts having large projected areas. Exclusive feature of this machine is the new HYDRA-LOCK high-speed 200-ton clamping mechanism . . . the safest, most powerful mold clamping device available today! Other features include injection pressures up to 15,100 psi, large platens, compensating feed, fast opening die-lock mechanism, automatic molding cycle and minimum maintenance.

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LEWIS WELDING & ENGINEERING CORP.
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Please send me Bulletin No. 102 describing the new LEWIS "6" plastics injection molding machine.

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Versatility

The versatility of vinyl dispersion compounds lend themselves to many wide and varied applications. The "know-how" of the Watson-Standard laboratories can adapt these products to your specific production and end uses.

Molding:

Watson-Standard Vinyl Plastisols and Rigidisols are applicable to both slush molding and dip molding. Such items as doll and doll parts, toys, spark plug covers, electrical components, novelties, puppets, toilet valves, boats, light sockets and others are illustrations of this type of application.

Dipping:

Watson-Standard Vinyl Organosols and Plastisols are readily applied by dipping. Varied end products include dishwasher baskets, dish racks and drainers, electrical wiring, gloves, and springs for the automotive and upholstery industries.

Spreading:

Watson-Standard Vinyl Plastisols and Organosols may be spread coated. Coated textiles and paper are typical of this type of application.

Spraying:

Special foundations of Watson-Standard Vinyl Organosols and Plastisols may be applied by spraying. Finishes for metal furniture, cabinets and blowers are representative uses.

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Since Watson-Standard Vinyl Plastisols are in liquid form and may be readily poured, they lend themselves to casting. Casting applications include films, sealants for automotive and refrigeration industries, ceramic pipe joint threads, and potting compounds.

Troweling:

Watson-Standard Vinyl Plastisols may be formulated for troweling. This type of application lends itself to linings for tanks and sealants.

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REXWELD extends SERVICE LIFE of Hartig extruder feed screws by 400%

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One of the most important parts of the plastic extrusion machines made by the Hartig Engine and Machine Company is the *feed screw*. This part propels heated plastic through an extrusion die under great pressures, and at rates as high as 2000 pounds per hour. Because the slightest amount of wear on the screw is so critical — on some jobs more than 0.010" means replacement — Hartig hardfaces them with REXWELD C by the oxyacetylene process.

The Hartig people have found that REXWELD C extends the life of the screws 400% over unsurfaced screws . . . provides a surface that resists abrasion and corrosion . . . and gives them a dense facing free from surface imperfections — an important factor from the standpoint of product contamination.

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REZISTAL STAINLESS • REX HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

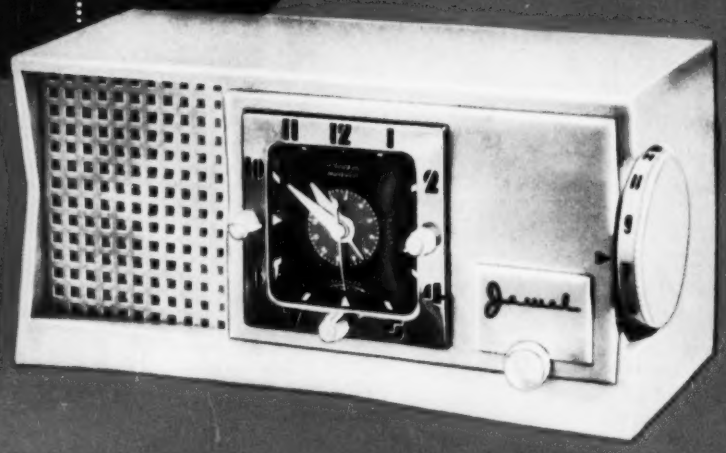
Appliance Manufacturers

Ideal can give you

the production you need

the quality you need

The injection molded plastic components for this Model 5125 clock-radio are supplied by Ideal for Jewel Radio Corp., East Newark, New Jersey



SINCE ADVERTISING and distribution schedules must be closely coordinated with production for maximum effectiveness, it is no wonder so many important appliance manufacturers select Ideal Plastics to custom mold their cabinets, dials, and other plastic components.

Not only does Ideal give them the high quality they must have, but the magnitude of Ideal's facilities guarantees dependable delivery. Ideal can be counted upon for an enormous amount of production.

Our molding plant, one of the largest in the world, is outfitted with every sort of automatic device to speed the finishing and decorating of your moldings. And shipment is made in Ideal's own fast truck fleet, or by rail, from Ideal's own siding.

If you are in the market for substantial quantities of custom injection molding, we think a visit to Ideal's plant will prove extremely interesting. Such a visit can be arranged, next time you are in New York, by getting in touch with A. C. Manovill, Vice President in Charge of Sales. IDEAL PLASTICS CORPORATION, 184-10 Jamaica Avenue, Hollis 7, N. Y. Phone AXtel 7-7000. Midwest Representative, Steel Mill Products Co., 176 West Adams Street, Chicago 3, Ill. Phone: CEntral 6-5136.

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The containers are used by the Kores Manufacturing Co. Ltd., as packs for their Pegasus Typewriter Ribbons.

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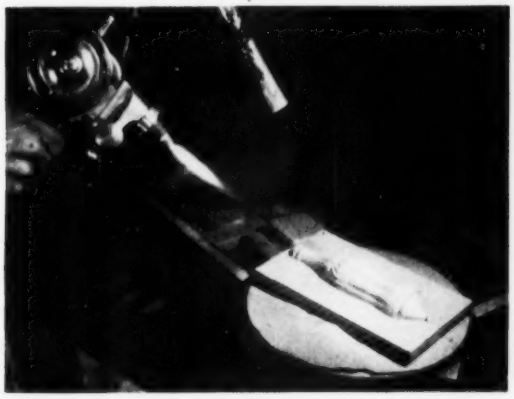
molds made in minutes

by fast, low-cost metallizing process

For low-pressure, vacuum, slush and lay-up molding.

Metallizing, the spraying of molten metal, is now being used for the production of molds for low-pressure, vacuum, slush and lay-up processes, in a wide range of mold sizes—some lay-up types as much as 30 feet long. These metal molds are made quickly, at low cost; masters may be of metal, cloth, wood, plastic, glass, or even wax. Finest detail is retained and mold life is practically indefinite. Part spoilage, "break-out" and patching or other maintenance on lay-up molds are eliminated; improved heat transfer, better curing, assure void-free parts.



Metallizing gun building up metal mold directly on plaster master

Finished mold. Note fine detail. Spraying time 28 minutes.

MODERN PLASTICS article describes method

The article, "SPRAYED METAL MOLDS," by *Dr. Walter Brenner* and *Leopold Hase*, of Brooklyn Polytechnic Institute, which appeared in the September MODERN PLASTICS, described the process in detail. We will be happy to send you a reprint of this article on request. Use the handy coupon.

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In Great Britain: METALLIZING EQUIPMENT COMPANY LTD Chobham near Woking, England

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METALLIZING ENGINEERING CO., INC.
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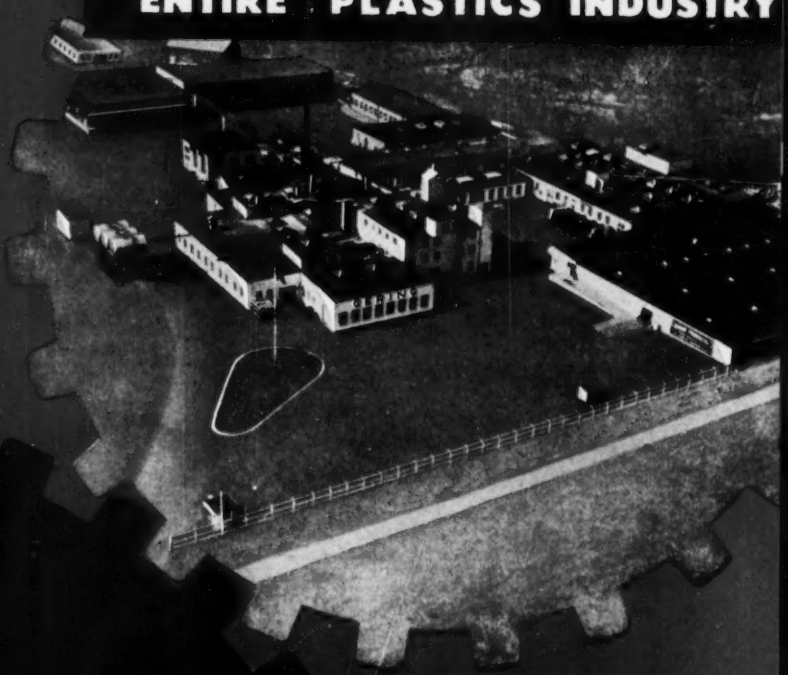

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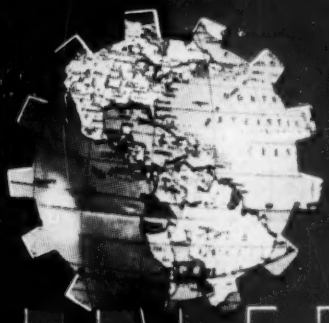

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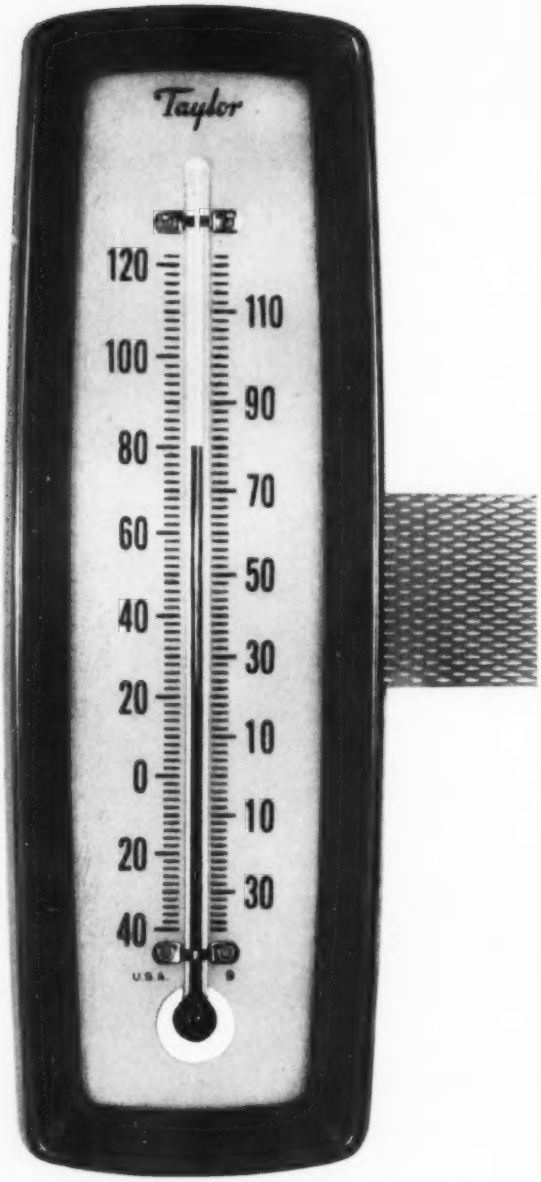

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● With brand-consciousness at an all-time high, a manufacturer cannot afford to endanger his reputation by using anything but top-grade components. Bearing the renowned name of the Taylor Instrument Companies, this handsome outdoor window thermometer boasts two Tenite parts, the colorful frame and the translucent back, skillfully molded by Norton. If you need fine injection or compression moldings to help you live up to your brand name, we are sure Norton can help. Norton's sensible pricing, on-time deliveries, sound engineering, and cooperative service will certainly be of interest.

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Precision-fit Fiore masks often spell the difference between a low cost, first rate paint job and sloppy decorating that costs far more than it ought to. Fiore masks assure sharply defined edges and close registration of colors. They are *engineered* by *specialists* who have designed and built all types of masks for some of the country's leading, most particular molders.

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Write today for additional details. Include samples or drawings for estimates on electroformed masks that will insure precision spraying.

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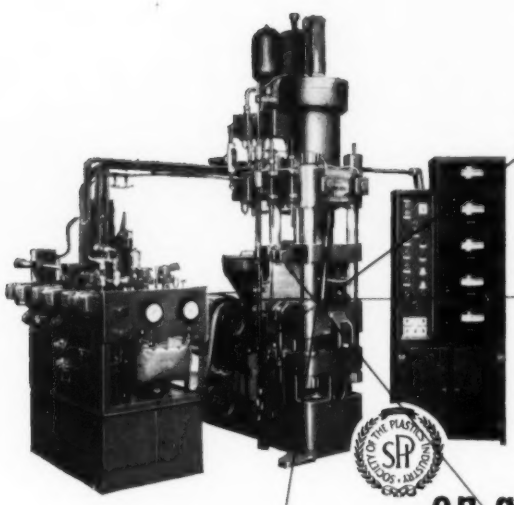
Something NEW in injection molding!

Rigid unplasticized polyvinyl chloride injection molding . . .

proved on one-a-minute production of threaded pipe fittings . . .



on a JACKSON & CHURCH pre-plasticizing press

For the first time, it is now possible to injection mold rigid unplasticized polyvinyl chloride parts on a production basis. Use has proved the pipe fittings shown are capable of withstanding severest strength tests, alkalies, alcohols and other corrosive acids.

The successful molding was accomplished after a year's concentrated research with new Jackson & Church press featuring the Hendry preplasticizing system. This newest J-C press is outstanding for its ability to injection mold completely uniform, strain-free parts with any thermoplastic material, *including rigid polyvinyl chloride.*

J-C produces a complete line of pre-plasticizing presses up to 200 ounces in capacity.

Hendry PRE-PLASTICIZING PROCESS J-C JACKSON & CHURCH CO. Saginaw, Michigan

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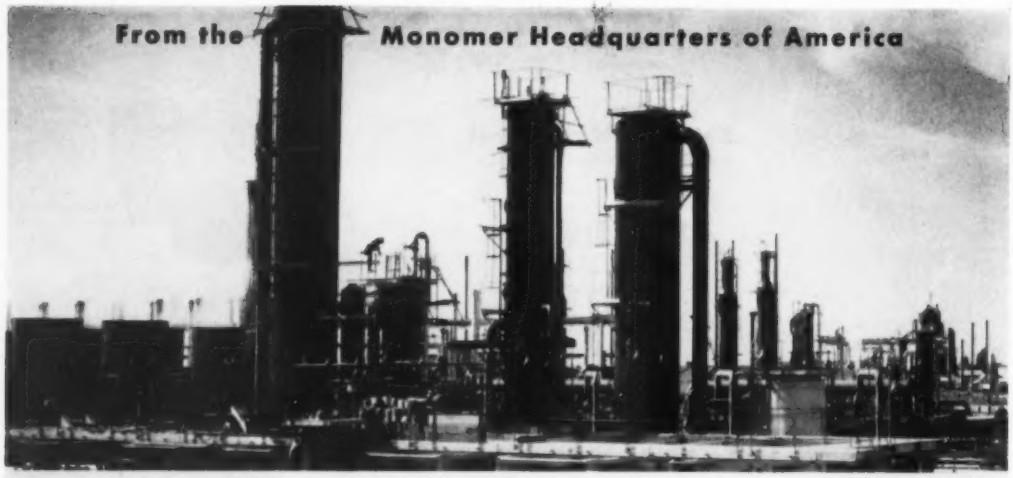
Work well done since eighty-one



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The "big three" in monomers . . . Monsanto's STYRENE, ACRYLONITRILE, VINYL CHLORIDE . . . are your answer. They are among the most versatile organic compounds yet developed. They have many potential new uses.

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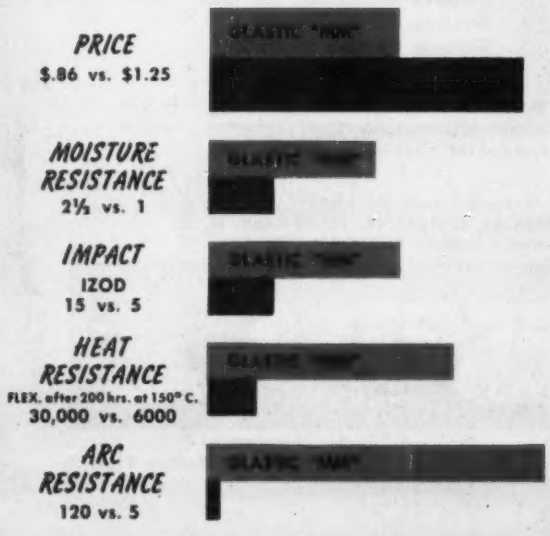
gives you Class 'B' Insulation at Class 'A' Costs!

GLASTIC "MM" vs. PHENOLIC "CE"



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Glastic sheet laminates bring you all this — for less than conventional phenolic laminates. Besides, you have negligible water absorption, easy machining and clean punching; full range of thicknesses from 1/32" to 1-1/4"; in sheet sizes 24" x 36" or 72" x 36". . . . Available also in molded form. . . . Let the Glastic technical staff open the way to a new high in insulation assurance.

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METASAP* STEARATES

Courtesy Boonton Molding Co.

superior lubricants in molding compounds

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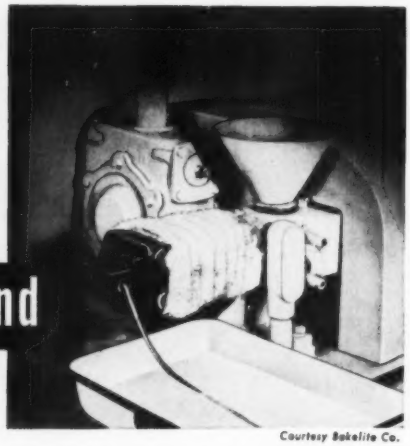

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Metasap Calcium and Zinc Stearates are unsurpassed as lubricants — in molding compounds, or when dusted onto surfaces of mold cavities. Molders using them eliminate preform delamination, and breakage of finished products, because all *ejection pressures are minimized.*

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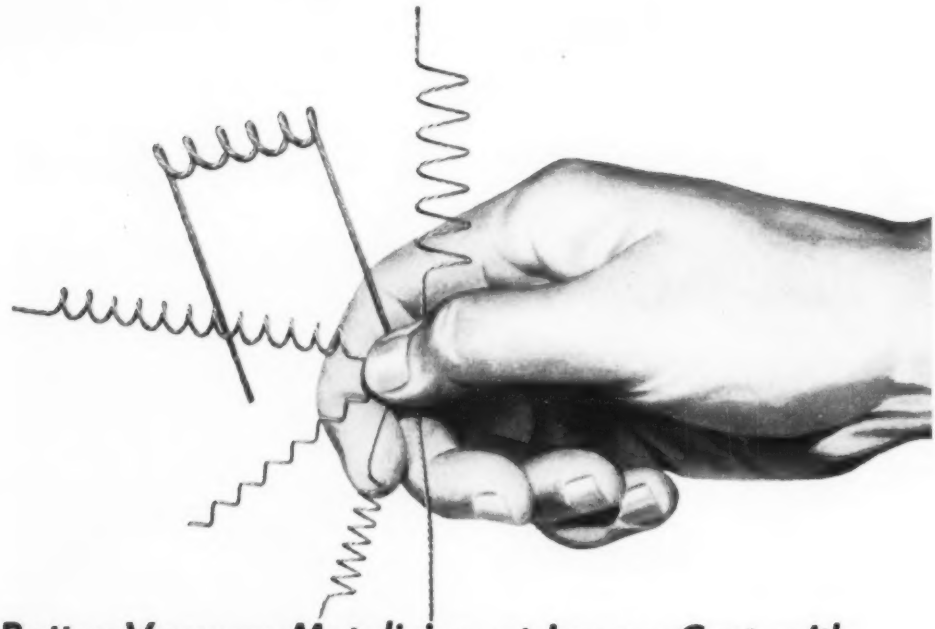

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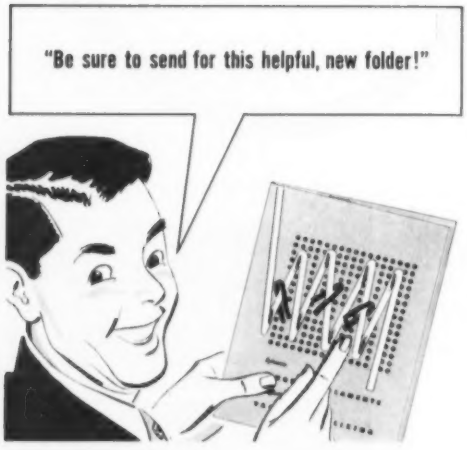
SYLVANIA TUNGSTEN COILS



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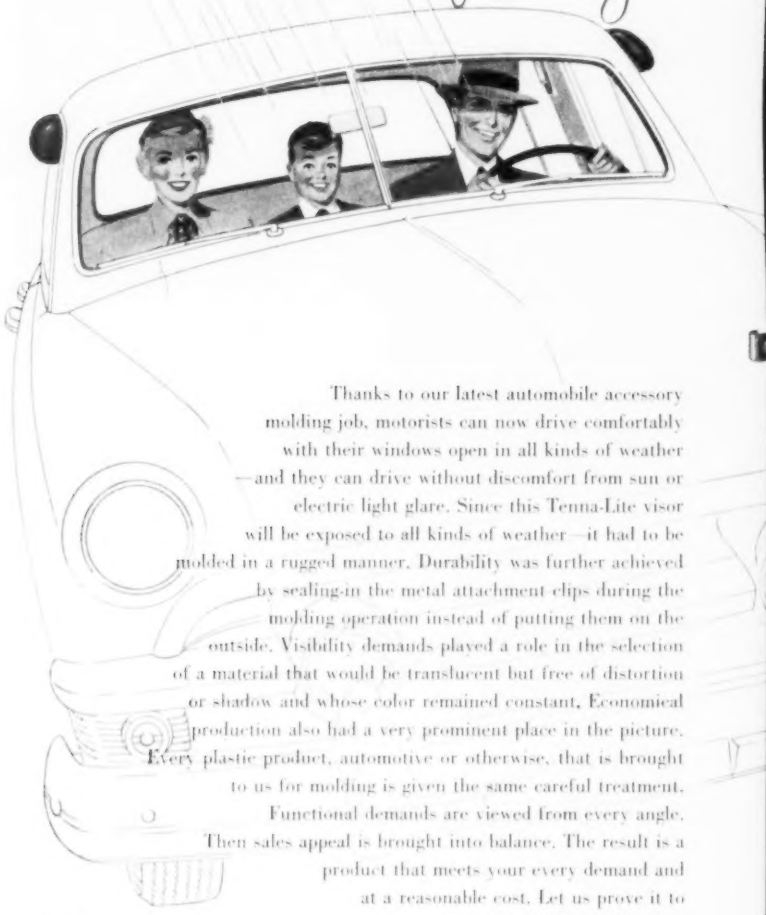
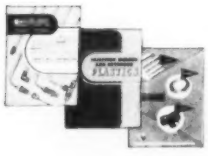
Comfortable Driving is a Matter of Molding



Thanks to our latest automobile accessory molding job, motorists can now drive comfortably with their windows open in all kinds of weather—and they can drive without discomfort from sun or electric light glare. Since this Tenna-Lite visor will be exposed to all kinds of weather—it had to be molded in a rugged manner. Durability was further achieved by sealing-in the metal attachment clips during the molding operation instead of putting them on the outside. Visibility demands played a role in the selection of a material that would be translucent but free of distortion or shadow and whose color remained constant. Economical production also had a very prominent place in the picture. Every plastic product, automotive or otherwise, that is brought to us for molding is given the same careful treatment. Functional demands are viewed from every angle. Then sales appeal is brought into balance. The result is a product that meets your every demand and at a reasonable cost. Let us prove it to you today without obligation.



*Write on your letterhead for new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about [redacted], piping, tubing and fitting), write for circulars containing data and illustrations. *Trademark Registered*

ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Fibestos, Ethocel, Nylon, Plexiglas, Polystyrene, Styron, Loalin, Vinylite, Geon, Pliofilm, Polyethylene, Cerex, Fortiflex, [redacted]*, Saran, and other Thermoplastic Materials

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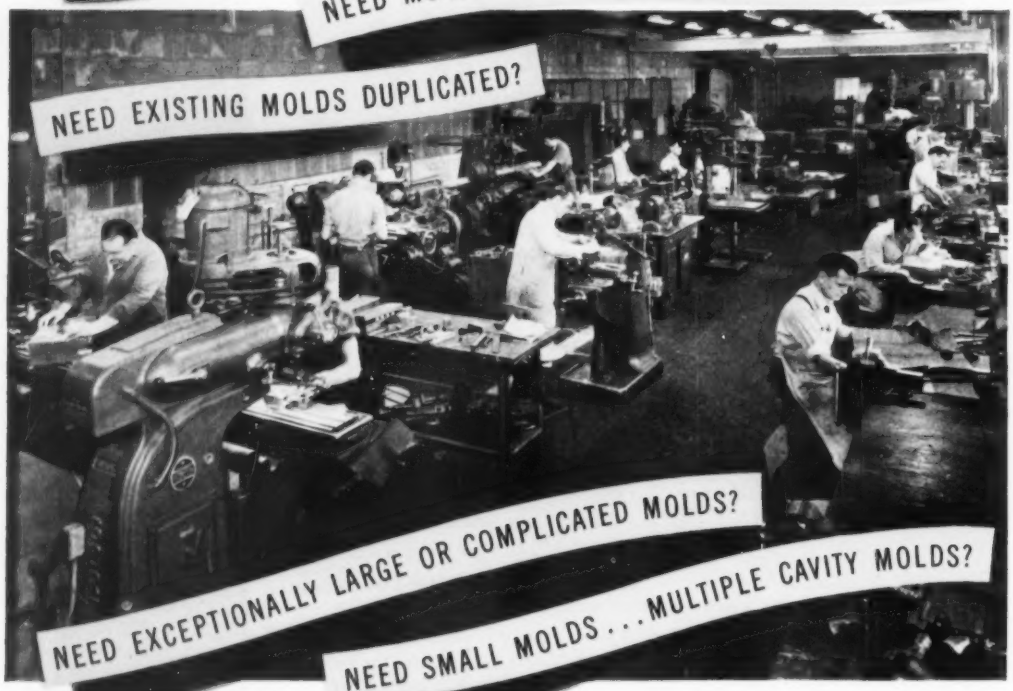
Tenna-Lite Plastic Door Visor, molded for Tenna-Lite Corp., Chicago

NEED ADDITIONAL MOLD-MAKING FACILITIES?

NEED MOLDS THAT POSE ENGINEERING PROBLEMS?



MPc will build your plastic molds

One of the industry's best equipped and most ably staffed tool rooms is yours to use, here at **MPc**. Here you will find advanced types of equipment operated by highly skilled craftsmen. These men and machines have solved many a challenging problem in mold design and fabrication . . . problems encountered while **MPc** paced the advance to ever larger plastic castings. Here at **MPc**, unmatched facilities and an unparalleled fund of experience are available for designing and tooling *your* plastic molds. Write to Molded Products Corporation, 4535 W. Harrison St., Chicago 24, Illinois.

FREE "Data Book of **MPc** Facilities," an engineering-eye view of **MPc** press capacities and other production facilities . . . together with a survey of **MPc** special skills available for your use. *Write for your copy.*

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DIVISION OF ADMIRAL DISTRIBUTORS, INC.
. . . Pace-Makers in Plastics Molding
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Serve the Lighting Industry

The lanterns for fluorescent lamps in London's Marylebone Road (installed by the General Electric Co. Ltd. of England) have clear 'Perspex' covers. 'Perspex' has extremely high light-transmission throughout the visible range, and its excellent optical properties are unaffected by the weather and by long exposure to ultra-violet light.

'Perspex' is easy to shape, and —where light control by refraction is required— prismatic plates can be efficiently and economically machined from it.

For other lighting applications 'Perspex' is available in a wide range of colours as well as in clear and opal. There are several opal grades having different transmission, reflection and diffusion factors.

Plastics manufactured by I.C.I. for the lighting industry also include 'Welvic' P.V.C. for cable insulation and white rigid P.V.C. sheet for lamp reflectors.

The supply of these products is backed by technical advice based on wide experience of plastics for lighting.

'Perspex' and 'Welvic' are registered trade marks, the property of I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

Plastics Division, Black Fan Road, Welwyn Garden City, Herts., England.

U.S.A. enquiries to: **J. B. HENRIQUES, INC.,** *521 Fifth Avenue, New York, 17.N.Y.*

P.537M

FIRST REAL ADVANCE

in materials testing equipment

IN 20 YEARS

Baldwin-Emery's REVOLUTIONARY SR-4® testing machine

At Testing Headquarters, after five years of development, Baldwin-Emery's new SR-4 FGT Testing Machine is now being produced in quantity. The most versatile of all universal testing machines, incorporating an electric weighing system and electronically-controlled loading mechanism, it is the first really basic change in materials testing equipment in the past twenty years.

With a 50,000 lb. load capacity, this SR-4 FGT Testing Machine has these characteristics which contribute to its remarkable performance: a single reversing screw drive . . . a single convenient specimen location for both tension and compression tests . . . automatic cycling of load . . . high speed response to dynamic as well as static loads . . . extreme structural rigidity . . . ability to feed back output from the load cells and SR-4 extensometer for control purposes . . . ability to record load vs. strain statically with the Baldwin-Peters SR-4 recorder as well as dynamically with oscillographs or oscilloscopes.

IT IS THESE CAPABILITIES WHICH MAKE THIS MACHINE SO VERY VERSATILE:

1. Static tension, compression, flexure and torsion tests.
2. Top center zero for complete reverse load cycle.
3. Alternating load cycling for fatigue testing between fixed load points or fixed deflection points.
4. Shock tests on structures.
5. Creep, stress rupture, and relaxation tests.
6. As a straining frame for experimental stress analysis using Stresscoat, strain gages and photoelasticity.

To learn more about this new testing machine, please write for Bulletin 4202 to:
Dept. 2226, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

TESTING HEADQUARTERS

BALDWIN - LIMA - HAMILTON

General Offices: Philadelphia 42, Pa. • Offices in Principal Cities

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SECRET PROCESSES AT WORK SUCCESSFULLY!

. . . The most convincing sales story we could tell you about WELDING ENGINEERS dual worm compounder—extruders is one with a unique performance record . . . and NO FACTS AVAILABLE!

First, name the top ten in the plastics manufacturing field . . . and you've named many of our best customers. Next, consider that most of them are building outstanding reputations for their products around SECRET processes. THEN: consider the fact that WELDING ENGINEERS compounder-extruders have an important production line responsibility in the execution of their secret processes.

Most of the assignments given our equipment are far from easy. They require a degree of perfection remote from that possible with ordinary compounding . . . or extracting . . . or extruding machinery. They apply our exclusive patented custom-fitted dual worm design and one-operation performance to such a wide variety of processing that no other equipment approaches its performance record . . . Mind you, to the satisfaction of America's leaders in your field . . . PLASTICS!

Secret process, or no secret process, you should know the complete story of WELDING ENGINEERS compounder-extractor-extruders before you invest in any equipment. We appreciate the opportunity of working with you or your engineering staff.

Write today for your copy of our General Catalog on the Applications of Welding Engineers Compounding-Extracting-Extruding Equipment.

WELDING ENGINEERS, INC.

NORRISTOWN, PENNSYLVANIA • MANUFACTURERS OF IMPROVED ONE-OPERATION MACHINERY FOR THE PLASTICS, CHEMICAL AND PETROLEUM INDUSTRIES

He knew it all

Ye Plastics Buyer, he knew it all,
Ye Plastics Buyer, his shots he would call;
"Mold it in styrene, or vinyl," he'd order,
Just like he was telling his tiny tot daughter.

"Everything's perfect and smooth" he would chuckle,
This small minded-gent with the head made of knuckle;
He ne'er made an error, he always was right,
Just try to correct him, he'd shoot you on sight.

His downfall stemmed from one small job,
It began with selecting the stuff for a knob;
For some hazy reason, acrylic he chose,
Tho' the choice was phenolic, as plain as your nose.

His molder protested, "You're going all wrong.
Two months from next Tuesday, you'll sing a new song."
Despite all the kicking, Ye Buyer stood firm,
"Don't quibble with me, or I'll blast you, you germ."

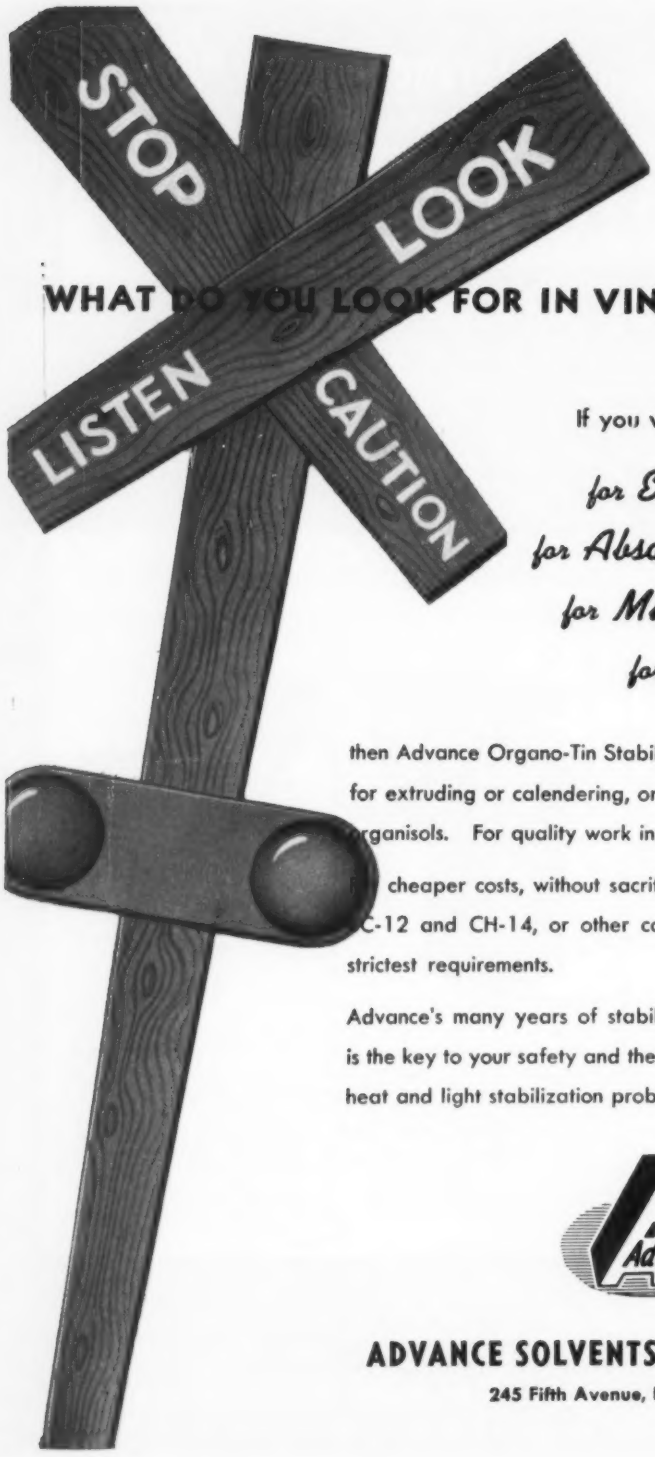
So mold of acrylic is just what they did,
And at the results, their faces they hid.
The Big Boss opined, "How this thing doth stink!"
And Ye Buyer of Plastics went over the brink.

Ye New Plastics Buyer, he too knows it all,
Ye New Plastics Buyer, his shots he can call:
Yet he places full trust in his molder's advice,
Especially if it's Boonton . . . and we think that's nice.

BOONTON MOLDING CO.

BOONTON, NEW JERSEY

NEW YORK OFFICE — CHANIN BUILDING, 122 EAST 42ND STREET, MURRAY HILL 6-8540



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If you want a one-stabilizer system

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for Absolute Transparency
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for Ease of Use

then Advance Organo-Tin Stabilizers are your answer—whether for extruding or calendering, or for processing of plastisols and organisols. For quality work insist on quality stabilizers.

cheaper costs, without sacrificing quality, try our Stabilizers C-12 and CH-14, or other combinations that will meet your strictest requirements.

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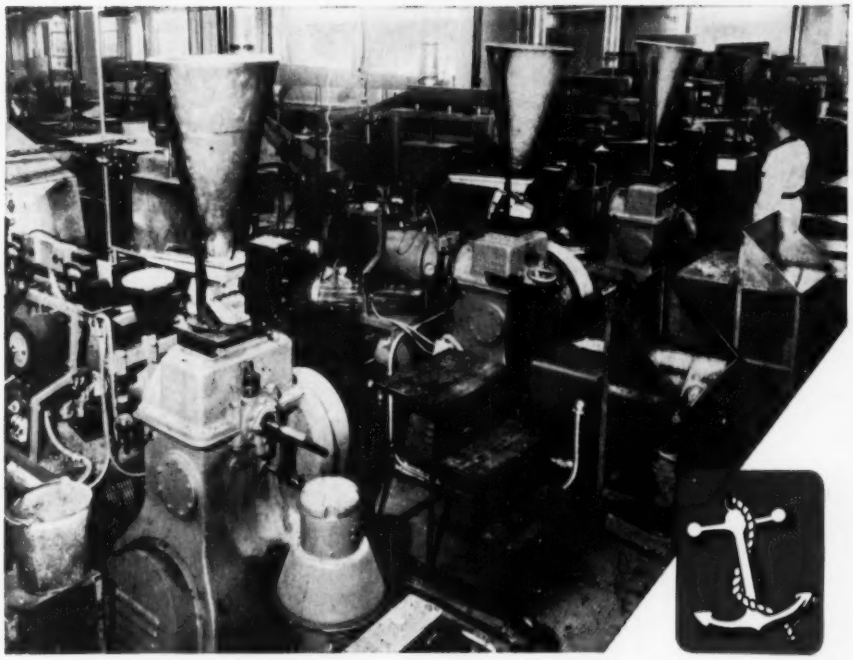

Anchor Plastics Company's

"PRECISION EXTRUSIONS IN THERMOPLASTICS"

Are Produced on NRM EXTRUDERS

"One NRM Extruder led to another, with us," writes R. A. Fisch, President, Anchor Plastics Co., Long Island City, N. Y. "And that's just how we started our business, too . . . with *one* NRM Extruder. Demand for its smooth, accurate extrusions soon required working it continuously, but it never faltered, even under peak loads.

"When we were ready to purchase more extruders, naturally we decided on NRM. The *twelve* NRM's we operate today are constantly proving the wisdom of that decision . . . they more than satisfy requirements for accuracy, economy and long life."

We're glad to know that NRM has played a part in the growth of the progressive Anchor Plastics Co. Today, their steadily increasing production totals well over a million pounds of plastic extrusions annually.

It is only natural that progressive plastics extrusion manufacturers everywhere should turn to NRM for extruding equipment of advanced design. From NRM's *creative* engineering came such progressive "firsts" as the electrically heated extruder . . . balanced heat control . . . the quick-opening die gate. If you're planning to purchase thermoplastic extrusion equipment, look into the NRM line today. A postcard brings you full information and data, promptly, without obligation.

ZIII

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General Offices & Engineering Laboratories: Akron 8, Ohio
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West: S. M. Kipp, Box 441, Pasadena 18, Cal.
Export: Omni Products Corporation, 460 Fourth Ave., New York 16, N. Y.

THE DOWDING AUTOMATIC *FAST-CYCLING*

INJECTION MOULDING MACHINE

Phenomenal Demand— Extends Manufacturing Programme!

- 1,200 CYCLES PER HOUR
- FULLY AUTOMATIC AND FOOLPROOF
- FAST PLASTICIZING AT UNUSUALLY LOW INJECTION PRESSURE
- AUTOMATIC LUBRICATION
- 3-ZONE CYLINDER HEATING
- VICKERS DETROIT HYDRAULIC EQUIPMENT

BRITISH MADE

EARLY DELIVERY

SPECIFICATION

MACHINE CYCLES PER HOUR (Max.)	1200
APPROXIMATE WEIGHT OF MATERIAL PLASTICIZED PER HOUR (Dependent upon weight per shot and material used)	22 lb.
Area of Injection plunger	2·074 sq. in.
Pressure per square inch on material at end of plunger	9100 lb.
Total pressure on Injection plunger	18,850 lb.
Mould opens (adjustable)	6-8½ in.
Maximum die space	7½ in.
Minimum die space	3½ in.
Maximum recommended casting area in mould	15 sq. in.
Size of die plates	16 x 10 in.

DOWDING & DOLL LTD
TELEPHONE: TATE GALLERY 9431 (10 LINES)

GREYCOAT STREET, LONDON, S.W.1
TELEGRAMS: ACCURATOOL, SOWEST, LONDON

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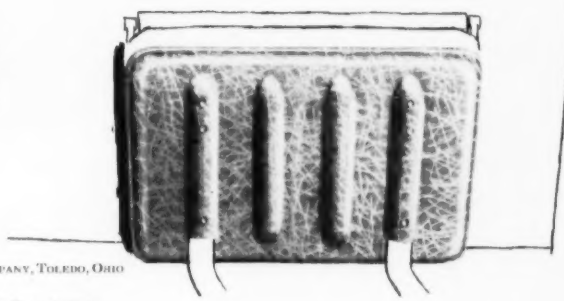
Another outstanding use of molded polyester resins and Fiber·Glass

This taxi seat panel, designed for auxiliary seating, is resistant to scratching and denting. It needs no repainting —its color is molded in. Smoothly molded corners won't snag clothing or mar luggage.



Molded by
THE CITY AUTO STAMPING COMPANY, TOLEDO, OHIO

As used in taxis manufactured by
CHECKER CAB MANUFACTURING CORPORATION, KALAMAZOO, MICHIGAN

This Checker Cab auxiliary seat panel is still another example of the wide possibilities in design and material properties offered in moldings of Plaskon Polyester Resins and Fiber·Glass.

Whenever you specify these materials you benefit in superior moldings . . . superior strength, lightness and durability. Moldings of L·O·F Plaskon Polyester Resins and Fiber·Glass are unexcelled in dimensional stability, flexural strength and resistance to common solvents and weathering.

In addition, Fiber·Glass roving, treated by the Garanizing process, gives increased wettability for a higher degree of translucency and added strength in the moldings. Moreover, Plaskon Polyester Resins have a longer flow period with a rapid gel time and give better surface characteristics to your finished product.

For uniform quality of ingredients . . . for the benefits of L·O·F Fiber·Glass Garanized roving . . . for one reliable *single source* for all these materials, check with Plaskon. For information or technical assistance, write today to Plaskon Division, Libbey·Owens·Ford Glass Co., Dept. 163, Toledo 6, Ohio.

PLASKON DIVISION
Libbey • Owens • Ford Glass Company
Toledo 6, Ohio

District Offices: Boston • Charlotte, N.C. Chicago • Cincinnati • Cleveland Detroit • Los Angeles • New York Philadelphia • Washington, D.C.

Manufacturers of Molding Compounds, Glues, Industrial and Coating Resins

In Canada:
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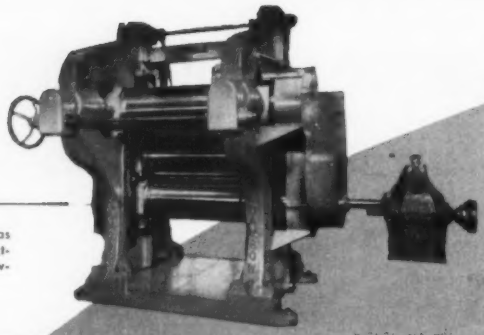


16" x 36" FOUR-ROLL CALENDER

For rubber and sponge products. Has sleeve bearings, herringbone connecting gears, manually operated screw-downs, and grease lubrication.

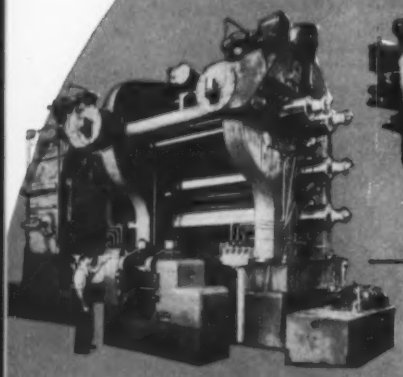
20" x 54" THREE-ROLL CALENDER

For medium speed production of various types of rubber products. Equipped with herringbone even speed and friction gearing, sleeve bearings, grease lubrication, and motorized roll adjustments. Drive can be adapted to suit available space.

ADAMSON UNITED CALENDERS -

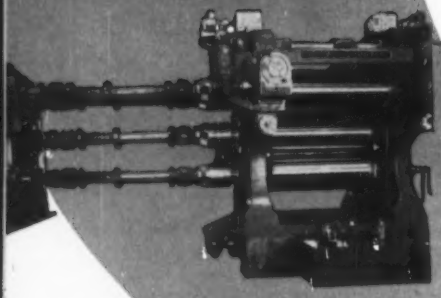
30" x 54" TWO-ROLL HORIZONTAL CALENDER

For finishing asphalt floor tile. This machine is equipped with roller bearings, drilled rolls, pinion stand drive with universal couplings, motorized roll adjustments, and adjustable speed control for tandem operation.



36" x 92" FOUR-ROLL PRECISION CALENDER

Designed especially for the production of thin plastics film up to 72" wide. This unit also is equipped with roller bearings; has roll crossing and zero clearance equipment, motorized roll adjustments, separate pinion stand with universal couplings and flood lubrication.

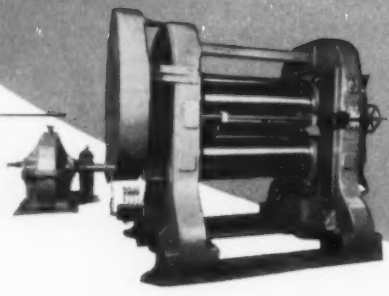


24" x 68" FOUR-ROLL DELUXE PLASTICS CALENDER

Produces 57" wide film at high speeds. Has roller bearings, zero clearance equipment, roll crossing device, roller bearing universal couplings, drilled rolls, motorized stock guides and flood lubrication. Drive is through a separate pinion stand which has its own complete flood lubrication system.

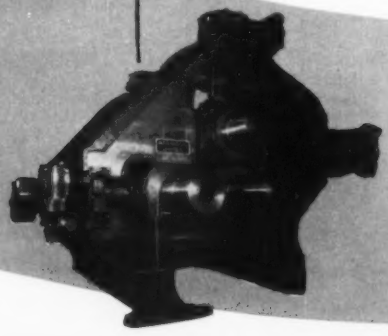
24" x 68" FOUR-ROLL Z-TYPE RUBBER CALENDER

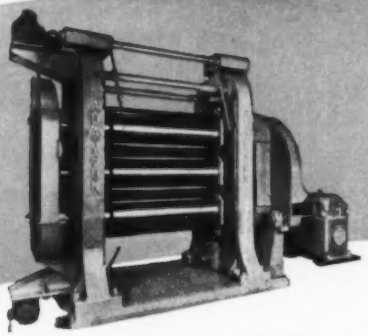
For high speed double-coating of tire fabric. Has sleeve bearings with grease or flood lubrication, motorized roll adjustments, herringbone connecting and drive gears, plus other features required for high speed production.



24" x 52" TWO-ROLL CALENDER

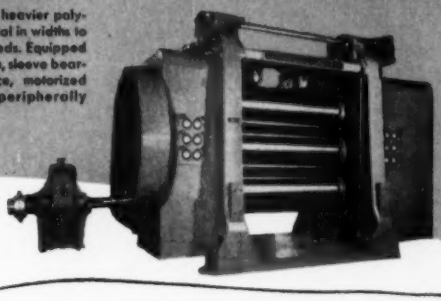
Another Adamson calender, vertical type, used in the production of floor tiling.





24" x 68" FOUR-ROLL STANDARD PLASTICS CALENDER

Produces 2 mil and heavier poly-vinyl chloride material in widths to 57" at medium speeds. Equipped with flood lubrication, sleeve bearings, zero clearance, motorized roll adjustments, peripherally drilled rolls.



- - for RUBBER and PLASTICS

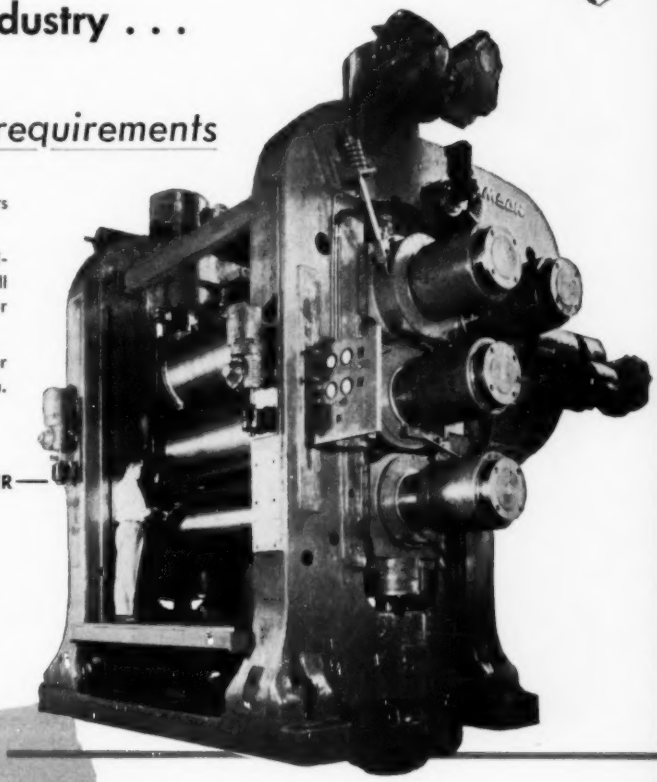
designed for the industry . . .

Engineered to your special requirements

Shown are some of the many types of calenders made to order for our customers.

Given product specifications and required maximum speed, we will design, build and install all basic and auxiliary equipment required for your complete manufacturing process.

We invite your inquiry concerning calendering or any other rubber or plastics processing problem.



32" x 92" FOUR-ROLL PRECISION CALENDER

This unit is geared to produce 72" wide vinyl film, 2 mils and less in thickness, at production speeds up to 150 YPM. It is equipped with anti-friction bearings, zero clearance, motor operated stock guides, motor operated roll crossing device, flood lubrication, universal couplings, pinion gear stand, drilled rolls and automatic temperature control. The electrical drive includes separate DC motors for each component, with speed trimming devices. Auxiliaries consist of embossing equipment, cooling unit and automatic turret-type windup.

ADAMSON UNITED COMPANY

730 CARROLL ST., AKRON 4, OHIO

A Name as old as the Rubber Industry

Branch Offices in Principal Cities

Subsidiary of United Engineering and Foundry Company

Plants at: Pittsburgh • Vandergrift • New Castle • Youngstown • Canton

BETTER MACHINES AND PROCESSES FOR BETTER RUBBER AND PLASTICS PRODUCTS

The vacuum metallizing production line at J. B. Products Co., Chicago, includes two CVC 48" coaters (Model LC1-48A) and one CVC 36" coater (Model LC1-36). This installation makes possible economical mass production of vacuum metallized plastic parts. The units are complete with all necessary controls and do not require specialized technical knowledge to operate.

These CVC vacuum coaters make plastics shine brighter than a new dime

Vacuum metallizing gives plastic items a bright, sales-compelling gleam.

The items illustrated here, produced by J. B. Products Co., Chicago, suggest the unlimited possibilities of this modern coating technique. It works just as well on scrap plastics as on the most expensive materials. You can coat hundreds of items at a time using only a few ounces of aluminum. A variety of metallic colors are easily obtained with an appropriate lacquer topcoat.

CVC supplies the vacuum coating equipment that makes this process so efficient and economical. Our experience in both high vacuum metallizing and associated lacquering operations is available to help you set up your system.

To get started in this rapidly growing business, just write to ***Consolidated Vacuum Corporation, Rochester 3, N. Y.*** (A subsidiary of Consolidated Engineering Corporation, Pasadena, Calif.) Sales offices: Menlo Park, Calif. • Chicago, Ill. • Camden, N. J. • New York, N. Y.

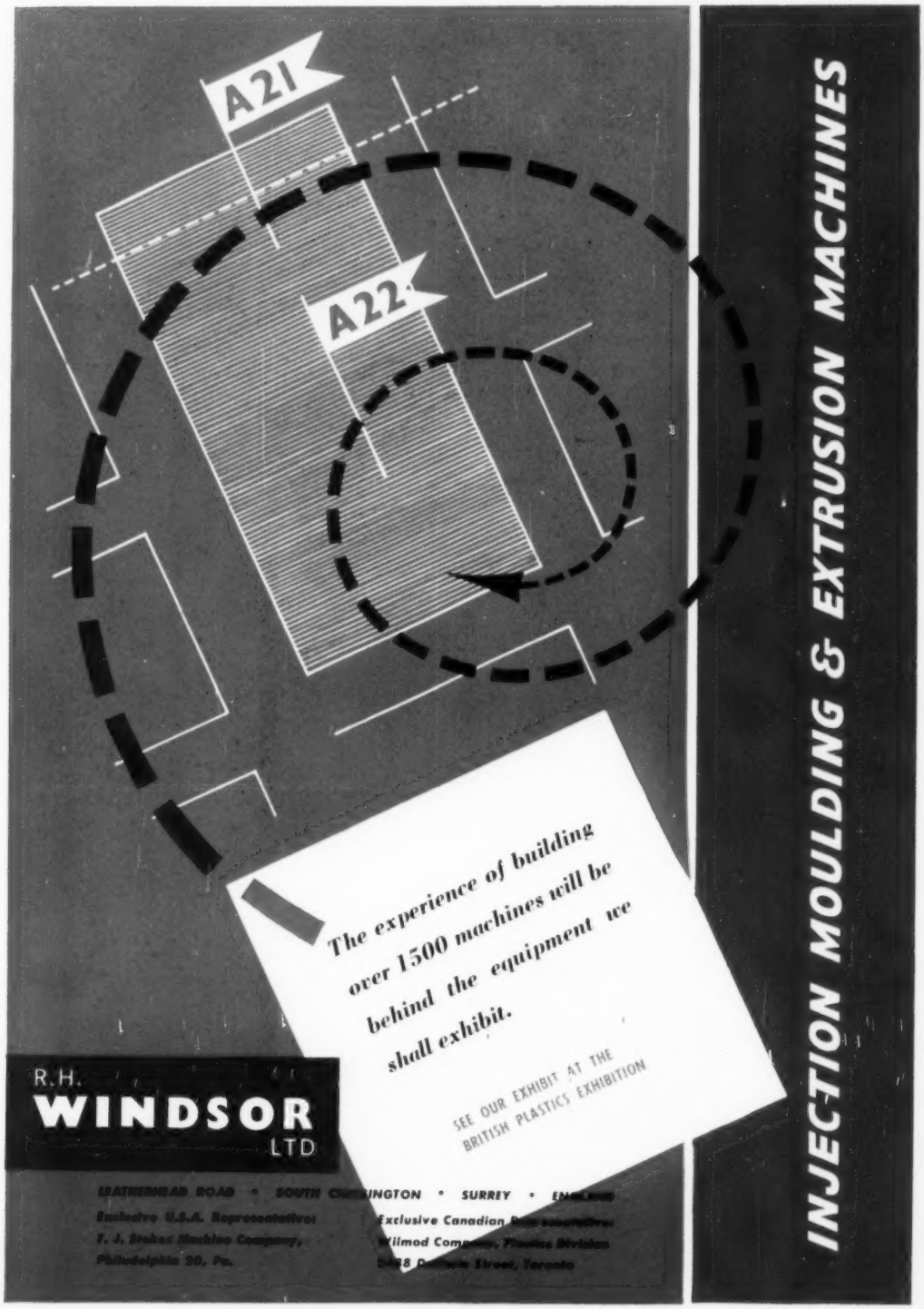
CVC

formerly DPi Vacuum Equipment Dept.

Consolidated Vacuum Corporation

Rochester 3, N. Y.

high vacuum research and engineering


A21
A22
The experience of building over 1500 machines will be behind the equipment we shall exhibit.
SEE OUR EXHIBIT AT THE BRITISH PLASTICS EXHIBITION
R.H.
WINDSOR
LTD
INJECTION MOULDING & EXTRUSION MACHINES

Tupper Seal, air and liquid tight flexible covers fit, and are included in the sets of all Tupperware Canisters.

The Tupperware 50 oz. Canister is "standard equipped" with the Tupper Seal, air and liquid-tight flexible Pour All cover.

The Tupper Seal, air and liquid-tight flexible Pour All cover is used on every Tupperware 20 oz. Canister.

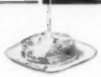
The Tupper Seal, air and liquid tight, Pour All cover as a cover for 46 oz. cans; Tupperware Sauce Dishes and other containers of metal, glass or pottery. Foods easily dispensed without removing entire cover.

The Tupperware Wonder Bowls are usually fitted with Tupper Seal, air and liquid-tight covers.

Argentine Patent 74,095 dated Dec. 14th, 1949 on invention covered by U. S. Patent 2,487,400 November 8, 1949. Canada Patent 463,387 Feb. 28th, 1950. Union of So. Africa Pat. 8,592 Sept. 21st, 1949. Belgium Pat. 491,293 Oct. 15th, 1949. Switzerland Patent 48,970 Sept. 23rd, 1949. Italy Patent 456,937 September 19th, 1949. Germany Patent 829,248 September 25th, 1949. Great Britain Patent 662,219 September 27th, 1949. Argentina Patent 96,970 September 30th, 1949. Brazil Patent 39,676 December 29th, 1951. Mexico Patent 51,615 January 3rd, 1952. Other U. S. and Foreign Patents Pending.

TUPPER / Seals

air and liquid-tight, flexible covers for Tupperware Tumblers, Canisters, Wonder Bowls, Cereal Bowls and many another container of glass, metal and pottery, the contents of which it is desired to keep fresh and wholesome.



TUPPER /

FORMAL NOTICE! 9th November, 1949

EXCLUSIVE!

U. S. Patent #2,487,400

The Tupper Corporation has attained a position of leadership in this industry by incurring great expense and expending painstaking effort in the development, design, manufacture and exploitation of its many world-known products.

The Tupper Corporation further has anticipated the inevitable attacks to which leadership is subject and has taken measures provided by law to preserve the creative rights to its products, methods and design by patent protection both in the United States and abroad.

Tupper Seals for Tupperware shown in this advertisement are just a few of the forms covered in this manner and are specifically covered by U.S. Patent #2,487,400.

Only the Tupper Corporation, by U.S.Patent #2,487,400 has the right to make, use and vend container closures in connection with any and all types of containers throughout the United States and its territories as covered by the claims of the Patent.

Tupper Corporation will protect, according to law, the exclusive rights above granted

TUPPER CORPORATION

There's a Tupper Seal, air and liquid-tight flexible cover for Tupperware 2, 5, 8 and 12½ oz. Tumblers too, and these Tupper Seal, covers fit many other containers of metal, glass and crockery.

The Tupper Seal, air and liquid-tight flexible Pour Top cover, specially designed as a dispensing cover for specified diameters of containers holding foods such as syrups, salad dressings, catsup.

The cover of the Tupperware Bread Server which serves as a bread tray also is designed to give similar results as Tupper Seal, air and liquid-tight Flexible covers. Keeps contents fresh as no other such container.

When equipped with Tupper Seal, air and liquid-tight, flexible covers, Tupperware Cereal Bowls serve many another purpose.

The Tupper Seal, air and liquid tight flexible cover made for Tupperware 8 oz. Tumblers also fits and is sold with all Tupperware Funnels as a base when funnels are used as storage containers.

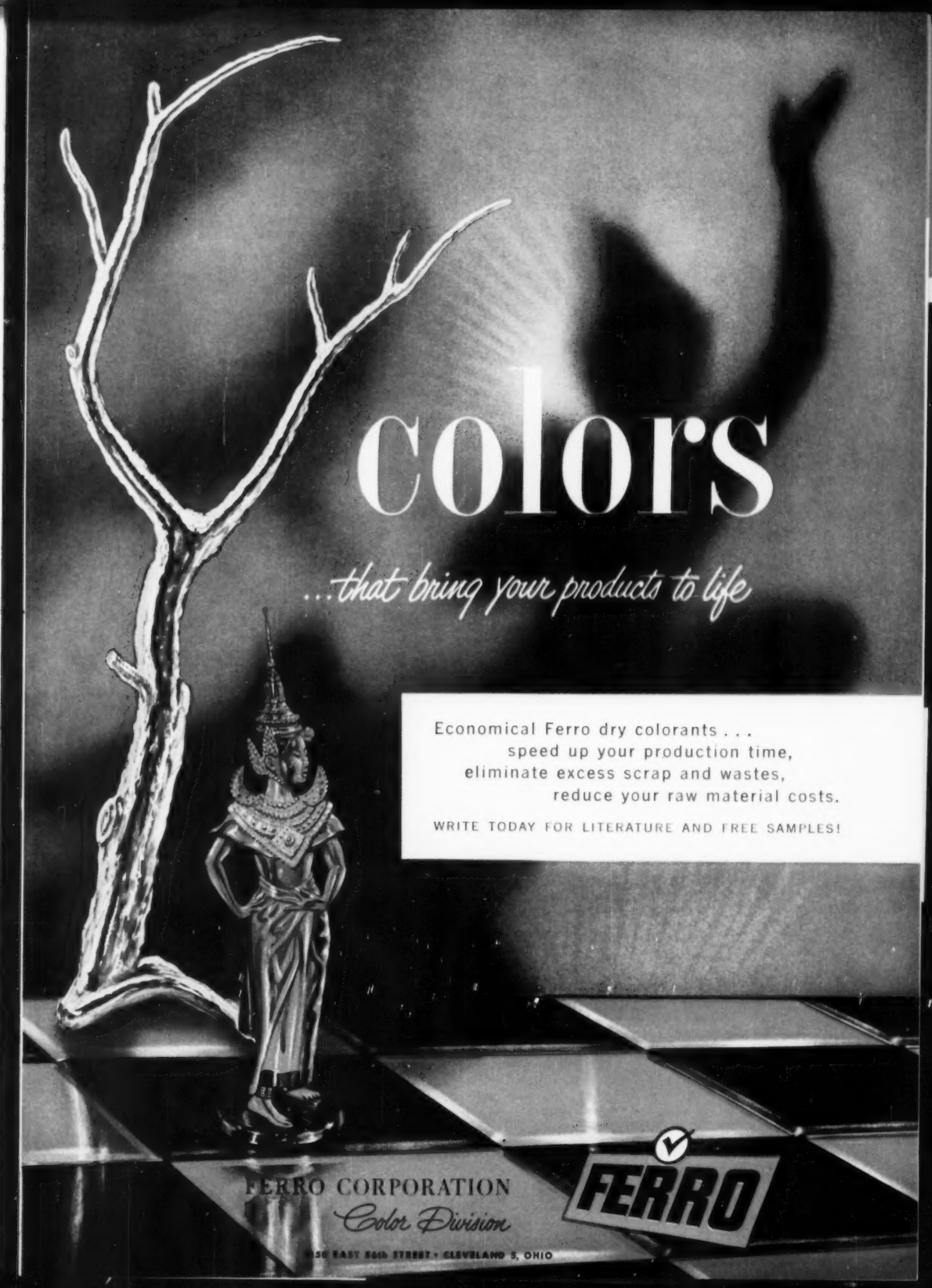
TUPPER CORPORATION

TUPPER

Manufacturers of — CONSUMER, INDUSTRIAL, PACKAGING AND SCIENTIFIC PRODUCTS

Factories, Laboratories and Sales Offices: Farnumsville, Mass., Orlando, Fla., L'Epiphanie, P.Q. Showrooms: 225 Fifth Ave., N. Y. C.

ADDRESS ALL COMMUNICATIONS TO: Department M-6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★★★ PLASTICIZER NEWS ★★★

INCREASED AVAILABILITY

Widens Use Of Plastolein Plasticizers as Primary, Basic Types

The completion of Emery's revolutionary ozone-oxidation plant in several months will increase the availability and improve the economic position of Plastolein Plasticizers to the point where they can be used more widely as primary plasticizers.

This particularly applies to Plastolein 9720 Polymeric. Greater availability at present economic levels, together with its proven performance, make this product particularly appealing as a primary plasticizer. Not only does it have all the requisites of a basic plasticizer, but its permanence in terms of resistance to water and oil, and low volatility, is superior to most primary-type plasticizers. In addition, 9720 is extremely stable to both heat and light, does not deteriorate or cause brittleness upon aging, and has the efficiency common to most monomeric types.

Proven Performance

Plastolein 9058 DOZ (di-2-ethylhexyl azelate) also has the performance requirements of a primary plasticizer. Now, because of new processing methods, such as the ozone-oxidation process, the economic picture is improving rapidly. This, coupled with greater availability and proven performance of Plastolein 9058 will lead to its wide selection as a primary, basic plasticizer in the not too distant future.

Emery invites all manufacturers who are not already using a Plastolein Plasticizer, to start an evaluation of these two products immediately. Samples and descriptive literature are available on request.

Completion of Plant Building Marks First Major Step Toward Increased Production

The new building which will house Emery's revolutionary ozone-oxidation process has now been completed. Already it contains some of the unique equipment for this operation which is scheduled to go on line in several months.

Emery's New Ozone-Oxidation Plant

Production of Azelaic and Pelargonic Acids, from this plant, will result in increased quantities of those Plastolein Plasticizers which are based on these exclusive, unique saturated acids. Specifically, this involves Plastolein 9050 DHZ (di-2-ethylbutyl azelate), Plastolein 9058 DOZ (di-2-ethylhexyl azelate), Plastolein 9055 DGP (diethylene glycol dipelargonate), Plastolein 9715 and 9720 Polymerics.

The acids themselves are used also in the manufacture of alkyd resins, synthetic lubricants, nylon-type polyamides, soaps, and in the flotation of various minerals. The greater availability of these acids should open up many new avenues of research based on their unique properties.

Plastolein 9057 DIOZ Announced!

Di-iso-octyl azelate Now Available in Commercial Quantities

The addition of Plastolein 9057 DIOZ (di-iso-octyl azelate) to its general line of Monomeric and Resinous Plasticizers has just been announced by Emery.

Similar in performance to di-2-ethylhexyl azelate (Plastolein 9058) Plastolein 9057 is a primary, monomeric plasticizer for all types of vinyls, cellulosics and synthetic rubbers.

In addition to the efficiency, compatibility and permanence that make it a basic, primary plasticizer, Plastolein 9057 imparts excellent low temperature flexibility. It is applicable to vinyl calender sheeting, calender and cast film, calender and dispersion coated fabrics, extruded products and plastisol formulations. Plastolein 9057 also offers efficiency and low temperature properties for nitrile and GR-S rubbers and cellulosics.

Emery

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MODERN PLASTICS

JUNE 1953 VOL. 30, NO. 10

Polyethylene Probabilities

Polyethylene, perhaps the most exciting and interest-arousing of all plastics, gives promise of becoming also the fastest growing. Annual production capacity today is estimated to be somewhere around 125 million pounds. Capacity should soon be more and, by the end of 1953, may reach 200 million pounds. If all companies which have announced intentions to expand or enter the field have their complete facilities ready by January 1956, total capacity will approach 500 million lb. per year. Another 100 million lb. may be available from companies whose position is not yet clear. These figures exclude the potentials of several companies known to be considering entrance into the field, but it is unlikely that they can be ready by 1956 unless decisions are made soon. Experience shows that the time required to bring in a polyethylene plant for a satisfactory product is a matter of years rather than months.

The history of recent polyethylene growth and development can be traced in MODERN PLASTICS Bulletin from March 1951 through June 1952. Since June 1952, the polyethylene supply situation has been discussed in the following MODERN PLASTICS articles: January 1953, p. 66 ff; March 1953, p. 186 ff; April 1953, p. 214 ff; June 1953, p. 226.

Polyethylene is going into larger and larger molded items. Large wastebasket in background is 14 in. high; fire-extinguisher nozzle in front of it is 18 in. long; largest of mixing bowls at upper right is of 4 quart capacity. In center foreground is two-part milk-dispensing valve; beside and behind it are chemical plant pipe flange covers

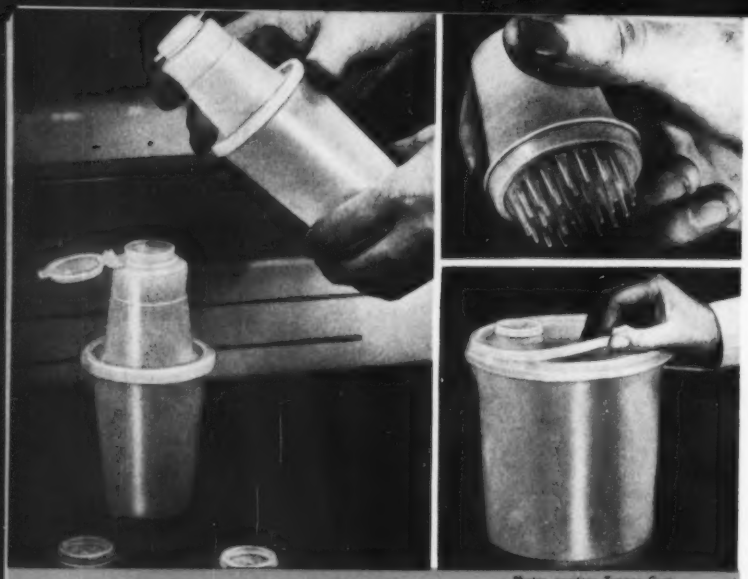
WITH molders and extruders clamoring for more polyethylene and output of the raw material being stepped up as rapidly as possible, it is time to take another look at this new wonder child of the industry and try to determine where it is bound. The present article, largely confined to molded applications, traces some of the principal lines of development. Since the present is the soundest key to the future, end users and molders should find this cross-sectional summary useful in projecting their planning.

Precocious Plastic

Polyethylene, a precocious[1] addition to the thermoplastics family, was first put into production during World War II. Originally developed in England and promptly reserved for radar and other high-priority electrical insulation work, polyethylene is a war baby which has never been able to enjoy full civilian status. With the armed forces continuing to take approximately a third of all polyethylene being produced in this country, molders and extruders eager to open the throttle on nonmilitary uses of this remarkable material must still temper their enthusiasm with patience.

You don't have to look far these days to find an injection molder who would like to be getting more polyethylene. Most of those who have had any experience with the material recognize that its many unusual properties make it a "natural" for a host of housewares, industrial items, toys, electrical parts, and miscellaneous products too diverse to categorize. However, with deliveries of

[1] See "Precocious Plastic," MODERN PLASTICS, February 1948, p. 73.



Photos courtesy Tupper Corp.

Variety and ingenuity characterize molded polyethylene housewares products. Typical applications (above) include beverage shaker (left), equipped with a hinged captive closure, shampoo applicator and scalp massager (right, top), and 8-in. high cannister (right, bottom), designed to hold either solids or liquids. Flexible woman's comb (below) weighs only 1 oz., is unbreakable, sanitary, and will not scratch the scalp

Courtesy Bakelite Co.

polyethylene from the two present domestic producers—Du Pont and Bakelite—on an allotment system, the full range of polyethylene's civilian capabilities will probably not be discovered until additional plant capacity, now in the planning or construction stage, is brought into play.

Properties

Since polyethylene resins are paraffinic in nature, they are relatively inert chemically, have outstanding electrical properties because they are relatively non-polar, and are characterized by lack of odor and taste, and by low toxicity.

The exact nature of these properties of polyethylene resins depends largely on their average molecular weight—tensile strength, stiffness, and abrasion resistance increase markedly with increasing molecular weight. Its average specific gravity of 0.92 makes polyethylene the lightest of the plastics, exclusive of foams. The material remains flexible over a wide temperature range without addition of any plasticizers; actually, it is incompatible with most other thermoplastics and plasticizers, except for certain synthetic rubbers, polyisobutylene, and paraffins.

HOUSEWARES

It is in the housewares field that some molders expect molded polyethylene to find its most prolific expansion. Although this material at present accounts for only a relatively small percentage of total housewares volume (with styrene far and away the dominant plastic used), this situation will probably change appreciably when polyethylene becomes available in sufficient quantities to encourage molders to take the wraps off important new applications.

Indicative of the variety and ingenuity which may be expected in molded polyethylene products for the home are several items just announced by Tupper Corp., Farnumsville, Mass. These include a large cannister, a versatile shaker for beverages, and a woman's comb. The cannister, 7¾ in. in diameter and 8 in. high, has a molded-in flange near the top, which gives added rigidity. Designed to hold solids (cookies, potato chips) or liquids (lemonade, punch), or for use as a deep-freeze container, the snug fitting lid has a large pouring hole with a tightly sealing cover.

The new Tupper beverage shaker is a versatile unit which fits standard 8- or 12-oz. Tupper tumblers. It has a captive cover which hinges out of the way for pouring and can be replaced with a strainer or with a cap having a single hole for inserting a drinking straw. Additionally, a rubber nipple can be attached to the opening to make a nursing bottle.

First women's comb to be molded of polyethylene is virtually unbreakable, flexible, and will not break the hair or scratch the scalp.

The position of Tupper Corp. as a pioneer molder of polyethylene was outlined on p. 74 of the February 1948 issue of MODERN PLASTICS. Backed by these years of experience, Earl S. Tupper of that company recently made the following statement:

"Our company molds all of the thermoplastics. Each serves specific purposes better than any other. Molded polyethylene, right from its creeping days, has inspired us with its wide range of possibilities in

packaging, premiums, toys, personal items, and industrial and scientific applications. The continued improvement in properties of polyethylene will expand its range of potentially good applications. Polyethylene holds a brilliant future for molders who are builders rather than scavengers. This material, plus imagination, plus study, plus intensive follow-through in a given field will do much for both molder and public."

Range Unlimited

One of the nation's leading producers of plastics housewares is The Plas-Tex Corp., Los Angeles, Calif. J. M. Jayne, vice president and general manager of that company has this to say about polyethylene:

"In our opinion, the applications of polyethylene in household products are almost unlimited." Referring to the large polyethylene wastebaskets now being produced by his company, Mr. Jayne continues: "They will not rust nor will they mar the floor or woodwork. They are light in weight, are virtually indestructible, and are easily cleaned with a damp rag."

Plas-Tex makes mixing bowls as well as wastebaskets. Says Mr. Jayne: "None of these products present any unsurmountable molding problems. The large wastebasket (14 in. high and 9½ in. in diameter at top) is run on a 32-oz. machine and we easily exceed 50 shots per hour with a very low reject rate. The small wastebasket (10½ in. high) is run on a 22- or 24-oz. machine at a speed in excess of 80 shots per hour, and again with a very low reject rate. The three sizes of mixing bowls are run on 16-oz., 12-oz., and 8-oz. machines, at speeds in excess of 100 shots per hour, 120 shots per hour, and 140 shots per hour, respectively. There are no special molding problems, but we have found that it is impossible to get too much cooling in polyethylene molds. Other than this, the manufacturing process is standard."

Courtesy Sparling Meter Co.

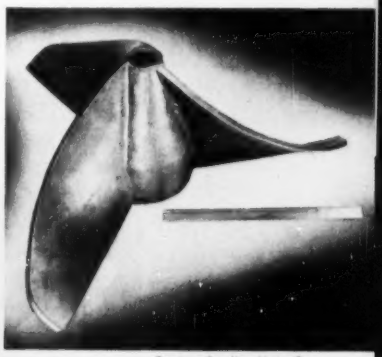
Polyethylene parts for 10-in. water meter valve (cross-section, right) include lining, which is injected directly into metal casting, and the hemispherical valve cone

Major Items

Even under present material restrictions, polyethylene is making its influence strongly felt in the housewares field. The following list, though by no means all-inclusive, summarizes the major housewares items being molded of this material at the present time:

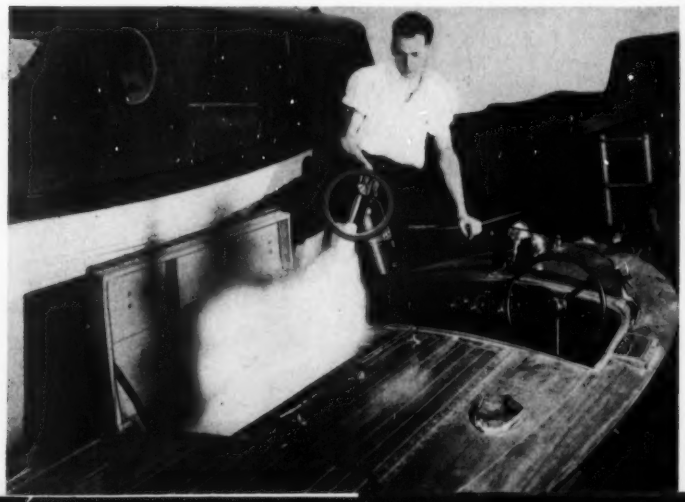
Mixing bowls, wastebaskets, tumblers, compartmented trays for silverware, etc., refrigerator bowls and covers, gelatin molds, flexible ice cube trays, can covers, bottle covers, silverware baskets for dish drainers, decorative coasters, juice mixers and containers, juice container covers, decorative holders for drinking glasses, freezer containers and covers, sink strainers, canister sets, refrigerator crisper boxes, bread containers, non-breakable dish and tumbler sets for infant feeding, cup and saucer sets, pie containers with sealing covers, salad bowl sets, cereal bowls, utility bowls, butter dishes, dish scrapers, dish pans, and beer can rims.

What are some of the qualities that render polyethylene a favorite for so many products used in the bath, kitchen, and other parts of the house? Important among them are the material's light weight, inherent color which cannot be washed off, and the fact that the material is un-



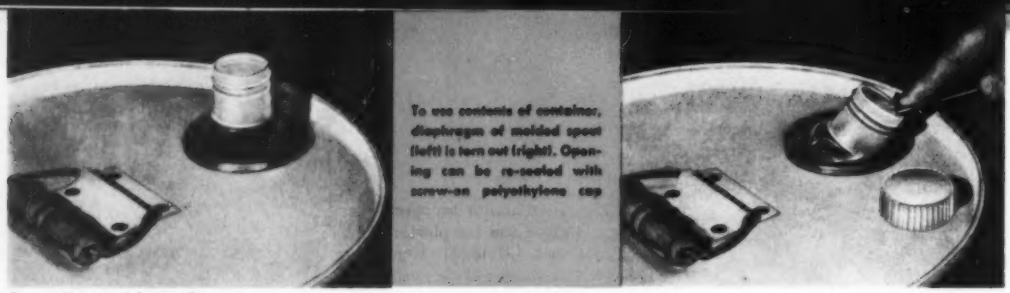
Courtesy Sparling Meter Co.

Over 8 lb. of polyethylene are used in molding 36-in. diameter water meter propeller



Rugged molded nozzle (circle) for fire extinguisher meets Underwriters' requirements

Courtesy Randolph Laboratories



Courtesy Rieke Metal Products Corp.

breakable. Polyethylene housewares can literally be bounced or stepped upon without chipping or breaking and retain their characteristic flexibility at all temperatures. When used for mixing bowls and related products, this flexibility permits the product to be squeezed to form its own pouring lip.

Molding Advantages

The resilience of polyethylene is particularly advantageous for all types of sealing lids and covers. It permits the parts to be molded with undercuts so that an air-tight fit is obtained with bowl, bottle, or other container—a practical impossibility with more rigid materials. This flexibility is also important to the molder. Polyethylene parts with undercuts can be molded without side cores and other features which complicate the mold, add to its cost, and lengthen the molding cycle; the undercut parts can easily be stripped from the cores without damage.

The development of color has greatly increased the appeal of polyethylene in housewares items. Originally this plastic was available only in the natural translucent white, but now the molder has a wide choice of translucent and opaque colors, and may color his own material in the plant if he so desires.

Polyethylene's ability to seal out moisture and odors, and its complete non-toxicity, make it ideally suited to food storage. For example, a molded polyethylene bread container with a tight fitting cover not only guards the food against insects but also prevents mildew or drying out, keeping the bread fresh and moist for long periods. Flavor transfer among different foods stored in the same refrigerator is prevented. Again, thanks to the flexibility and low temperature resistance of the material, polyethylene containers will not crack when food packed in them expands during freezing.

Polyethylene's resistance to breakage is dramatically demonstrated by such products as the attractive teacups produced by Republic Molding Corp., Chicago, Ill. Ordinarily, cup handles are considered about the most vulnerable item in the average cupboard, but the handles of these flexible cups are unaffected by dropping, bending, or careless handling, despite the fact that they are molded in an open design which provides a convenient and comfortable finger grip. Made in six pastel colors, the cups and saucers will not stain and can be sterilized, if necessary, with scalding water.

INDUSTRIAL APPLICATIONS

Despite the great potential for molded polyethylene in housewares, toys, and other consumer items, the industrial field may prove to offer even greater eventual opportunities.

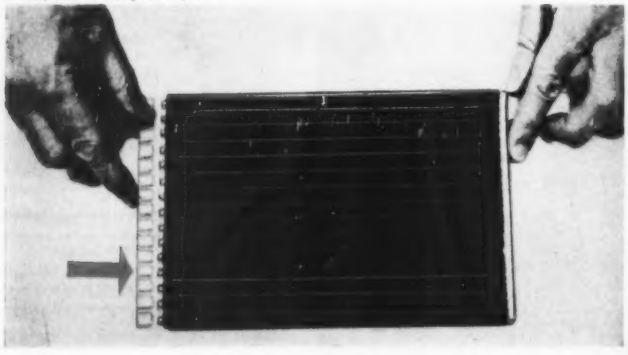
Considering the widespread use of polyethylene for products in this broad category, it is not hard to understand the enthusiasm of Richard A. Ryback, chief engineer of The R & K Tool & Die Co., Cleveland, Ohio, who says: "In our opinion, there is no other plastic material that offers so much for so many varied applications, and to our extreme liking is the fact that applications of this material are generally of a commercial nature."

Valves and Meter Parts

Food Engineering Corp., Manchester, N. H., wanted a valve for its dual bulk milk vending machine that

Acid-resistant polyethylene bottom bar (arrow), inserted into the positive plate of a storage battery, provides individual seals for tubes which contain active material

Courtesy Electric Storage Battery Co.



Perforated molded strainer is handy device for lifting drawing pens from a jar of cleaning solution

Courtesy Higgins Ink Co., Inc.

would be sanitary, efficient, and foolproof, yet sufficiently low in cost to be disposable. A polyethylene valve, molded in two parts by Worcester Moulded Plastics Co., Worcester, Mass., proved to be the solution. The valve, as engineered and produced by Worcester, consists of a valve body about 6 in. long and $3\frac{1}{8}$ in. in diameter, and a plunger of $\frac{7}{8}$-in. diameter, molded around an iron core. The complete unit is produced so inexpensively that it is cheaper to replace it at intervals with a new valve than to clean it.

Sparling Meter Co., Inc., Los Angeles, Calif., makes extensive use of molded polyethylene in its line of water control equipment. Several of these items are particularly notable from the standpoint of size and weight. J. W. Service of this company explains that preference has been given to polyethylene for several important reasons. The rubber-like flexibility of the material, when used in meter propellers, tends to allow small foreign particles in the liquid to pass the blades without damaging the meter or obstructing the flow, while its very low water absorption maintains dimensional stability even after prolonged submergence under pressure. The light weight of polyethylene means greatly reduced wear on meter parts and bearings.

Largest of these meter parts is a 36-in. propeller with metal insert. Containing approximately 8 lb. of polyethylene, the propeller requires a minimum of finishing.

Molded polyethylene parts in certain Sparling valves, catalogued in sizes from 3 to 16 in., include a hemispherical valve and its angle seat. In producing the valve, the manufacturer first casts the outer metal casing and machines it to specifications. Then aluminum cores are secured in place and the plastic material injected. Material required weighs $4\frac{1}{2}$ lb. for the valve itself and 35 lb. for the lining.

Safety Shields

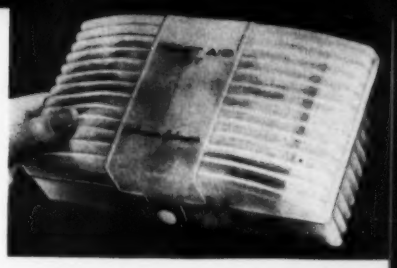
Wilmington Plastics, Inc., Wilmington, Del., has found molded polyethylene ideal for its line of safety shields used to cover valve flanges and bonnets in chemical plants. Not only will these protective covers safely withstand the corrosive effects of most chemicals likely to be encountered, but their semi-transparency permits quick visual detection of leaks as soon as they develop.

The valve bonnet shields cost approximately one-fourth as much as metal shields and will last indefinitely. They are quickly snapped in position at a fraction of the installation cost for shields of other types. They require no maintenance.

Fire Extinguisher Nozzles

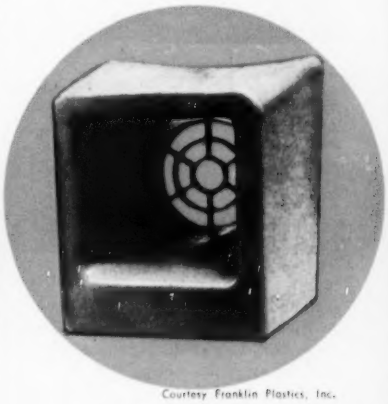
Randolph Laboratories, Chicago, Ill., a leading producer of fire extinguishers, is now molding polyethylene nozzles for use on several of its carbon dioxide type extinguishers. The "Flexrite" nozzles meet Underwriters' requirements that the discharge nozzle must be shatterproof within seconds after complete discharge of the CO_2, which lowers the temperature of the nozzle to approximately -40° F. The nozzles, molded of bright red material, are also crush-proof, springing back into shape unharmed even if stepped on or run over by a truck or car. Furthermore, the Randolph units provide electrical insulation up to 6000 v., meeting Underwriters' specifications for Class C fires.

Another highly functional industrial application of molded polyethylene is the Flexspout retractible



Courtesy Bakelite Co.

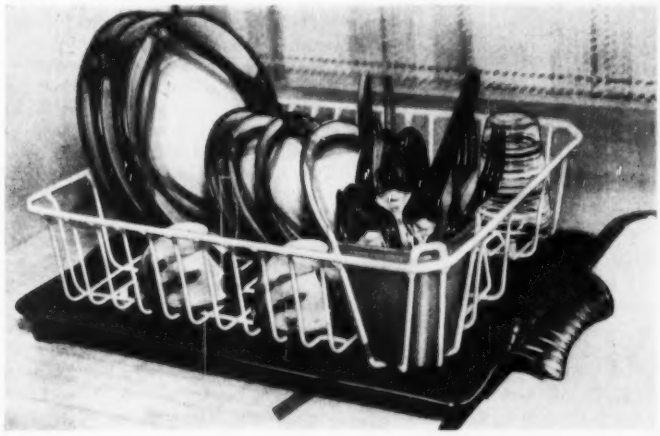
Tough, translucent first aid kit (top) is hinged (bottom) for easy opening



Courtesy Franklin Plastics, Inc.

Louver molded into funnel stops objects from falling into washing machine

Courtesy Artware Creations, Inc.



Dish drainer has rugged polyethylene basket (arrow) for holding silverware

Courtesy Imco Container Corp.

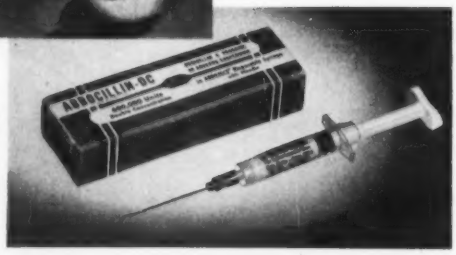
To dispense hair shampoo from tear-shaped, blown polyethylene container which can be fastened to a wall hook, the conical tip is turned ⅓ turn and flexible bottle squeezed

Courtesy Plax Corp.

Blow-molded bottles, designed for chemical shipment and a variety of other uses, range in size from 1 oz. to 13 gallons

Flexibility and chemical inertness of polyethylene are used to advantage in a series of squeezable atomizers and dispensers

Courtesy Plax Corp.



Disposable syringe, used only once and then discarded, utilizes polyethylene parts molded to close tolerances

Courtesy Abbott Laboratories

spout for 5 gal. steel pails, a product of Rieke Metal Products Corp., Auburn, Ind. Use of the patented spout greatly simplifies filling, storing and pouring of food products, liquid chemicals, etc.

The spout, easily applied to the container with one stroke of a simple hand tool, has a diaphragm molded across the top. When this is torn out and part of the contents used, the opening can be re-sealed with a screw-on polyethylene cap provided.

When extended for pouring, the Flexspout actually turns inside out so that it projects past the top of the container; upon being pushed back into the container, it resumes its original molded shape. It is furnished by the manufacturer as a complete, ready-to-use unit. In hydrostatic tests, pails burst at the seams without the Flexspout showing any evidence of leakage.

Under the trade name of Agilene, American Agile Corp., Cleveland, Ohio, makes extensive use of polyethylene in producing equipment for use in the chemical, electrical, and allied industries. Agilene products range from bottles, safety tubs, and tank liners to complete pipe-line assemblies, including fittings and valve and other chemical plant equipment. In working with this material, American Agile uses a combination of techniques which includes molding, casting, extruding, and hot gas welding of component sections into a finished unit.

Among the polyethylene parts made by this company are special hemispherical moldings approximately 28 in. in diameter, having a ½-in. wall thickness. They are manufactured by special extrusion-molding techniques, resulting in single-shot moldings weighing about 50 lb. each. One of the larger pieces of equipment fabricated from Agilene sheet is a TV picture tube washing machine tub used during the rinsing of picture tubes with hydrofluoric acid or a strongly alkaline clean solution. The outside diameter of the tub is about 105 inches.

Electrical Uses

The electrical characteristics of polyethylene have been put to effective use in such applications as insulating television picture tubes and watt-hour meter potential coils. Thanks to the ability of the material to withstand strong impacts and its immunity to chemical attack, it is also assuming an increasingly important role in battery construction. It has even been suggested that eventually the complete outer container for certain types of batteries, now customarily made of hard rubber, may be molded of polyethylene.

General Dry Batteries, Inc., Cleveland, Ohio, is now using molded polyethylene grommets in several sizes and types for small dry batteries. It is pointed out that this material offers possibilities of entirely new methods of producing dry batteries with longer life at lower cost. One type of grommet is molded by The R & K Tool & Die Co., Cleveland, Ohio. In general, polyethylene offers the best insulation material for this purpose since it has the necessary "sealing" qualities, is resistant to chemicals,

and can be molded into precise and intricate shapes.

In its Exide-Ironclad industrial storage battery, The Electric Storage Battery Co., Philadelphia, Pa., has found molded polyethylene to be the answer to a problem which has long plagued battery manufacturers. This difficulty is the loss of active material from the positive plate, which forms sediment in the bottom of the cell, representing lost capacity and reduction of battery life. To overcome this problem, the positive plate grid of the Exide-Ironclad battery is made up of metal core rods inserted in slotted hard rubber tubes. Active material is then packed into the tubes surrounding the rods. The slots afford free access of the electrolyte to the active material, but are sufficiently fine to prevent it from washing out.

Formerly, the bottoms of the tubes were sealed with a metal alloy bar. After considerable service life, however, corrosive action on the metal bar would break the seal, permitting active material to seep out. After extensive research, Exide adopted for this purpose a far superior bar molded in a single piece of polyethylene, with a plug for each tube which effectively and permanently seals the bottom against loss of active material.

Funnels and Floats

Other practical industrial applications of molded polyethylene include an automatic washing machine soap funnel molded for Bendix Home Appliances Div., Avco Mfg. Corp., by the Custom Div., Franklin Plastics, Inc., Franklin, Pa. The funnels, produced of gray polyethylene, have a circular opening with a louver which permits the soap to drop through, yet prevents larger objects from passing into the washer at this point.

Good Mfg. Co., New York, N.Y., produces a line of polyethylene toilet tank floats made by the blow molding process. The low water absorption of the plastic material, plus the fact that it cannot corrode in either hard or soft water, makes it an ideal medium for this application.

The chemical resistance of polyethylene plays a functional role in a new product introduced by Higgins Ink Co., Inc. The item is a perforated strainer used in conjunction with a bottle of pen cleaner. Attached to the center is a rod enabling the user to lift up the strainer from the cleaning solution and remove Speedball pens, drafting instruments, etc., from the solution without fishing around in the jar. The two parts forming the strainer are molded by Lumilite Corp., Pawling, N.Y.

The list of industrial items now being molded of polyethylene might be multiplied to include such products as aerosol valve parts, slush pump seal rings, explosive rivet guides, plastic rivets, chair leg tips, flexible spouts for caulking guns, vacuum bottle caps which can withstand the hardest knocks, and automotive spring liner inserts, which seal out grease and moisture and contribute to a more quiet, comfortable ride.

BOTTLES, CONTAINERS

It was the ubiquitous squeeze bottle that first made the public conscious of polyethylene in the

(*Continued on p. 196*)

Procaine and other injectables are administered directly from squeezable containers (right) with sterile needles attached

Courtesy Abbott Laboratories

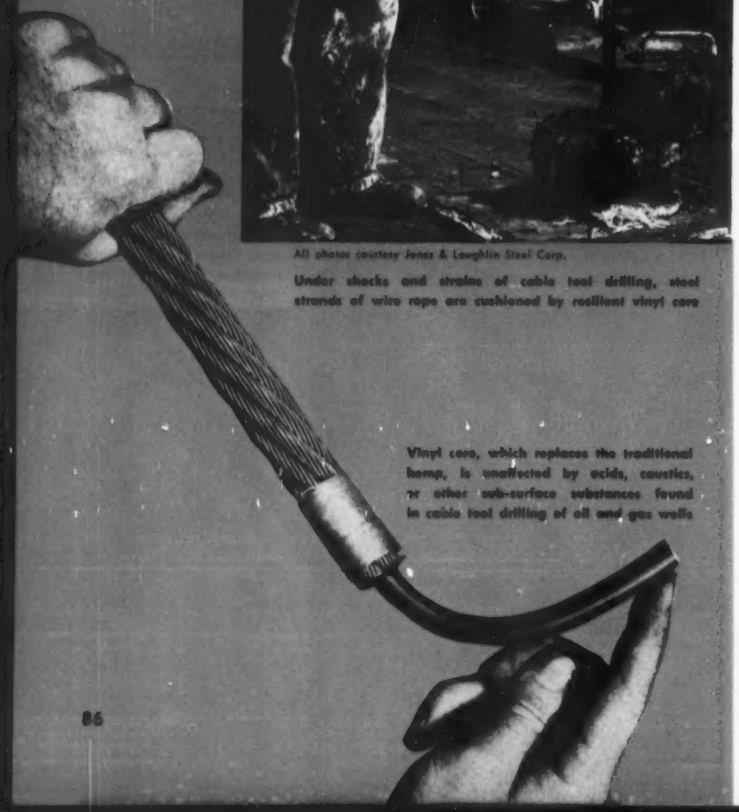
Low specific gravity of polyethylene permits boat-shaped hand brush to float

Personal products now being molded of polyethylene include poker chips and compartmented container, strainer for pen-cleaning solution, squeezable bottles, and a toy sand bucket (top row, left to right). Equally as practical and as attractive are the smaller molded items—key chain coin holder, dry battery grommets, shampoo brush, cigarette case, "rocket-ship" pencil, and water pistol refill unit (bottom row, left to right)

New

All photos courtesy Jones & Laughlin Steel Corp.

Under shocks and strains of cable tool drilling, steel strands of wire rope are cushioned by resilient vinyl core



Vinyl core, which replaces the traditional hemp, is unaffected by acids, caustics, or other sub-surface substances found in cable tool drilling of oil and gas wells

CABLE tool drilling of oil or gas wells is a rugged business. Equipment used must be capable of taking a terrific beating. Not only are mechanical stresses high, but chemical action from acids, caustics, and other destructive substances is frequently encountered.

Now vinyl, with its resilience and chemical resistance, has stepped into the picture. Jones & Laughlin Steel Corp., Pittsburgh, Pa., has just announced perfection of a polyvinyl chloride core for a steel wire rope used in cable tool drilling. Developed as a replacement for the hemp core that has traditionally been used, the vinyl core has already proved itself stronger, tougher, more resilient, and capable of better performance under adverse drilling conditions.

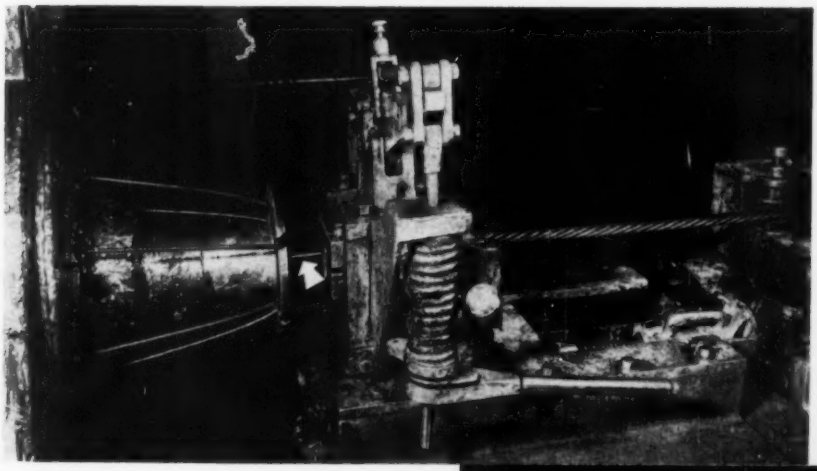
Cable Tool Drilling

The vinyl cored wire rope is intended specifically for cable tool drilling through hard sub-surface rock. Actually, this method is not true drilling, but rather a process of pounding a hole through rock by dropping onto it a heavy chisel-like bit suspended by the wire rope cable which passes over a pulley in the top of a derrick to a "walking beam" near ground level. Each time the bit is dropped—often as frequently as 30 times per min.—it is driven by its own weight to the bottom of the hole where it hits with the impact of an artillery shell and shatters the rock beneath it.

Since the tremendous shocks and longitudinal strains set up by this action tend to draw the outer steel cable strands towards the center, it is the function of the core to provide a resilient base against which the strands of the steel wire rope can "bounce" harmlessly.

In contrast to the hemp core, which will break down and lose its effectiveness under shock or the action of destructive sub-surface substances, the vinyl core will maintain its resiliency despite acids, caustics, or similar agents. The vinyl does not absorb moisture and, unlike hemp fibers, which need a

Vinyl Core in Steel Cable



Steel strands (left) are formed around the vinyl core (arrow) as it passes through the die of a closing machine. Finished rope emerges at the right

Polyvinyl chloride core, extruded to close tolerances, is wound on reels and carefully inspected before being sent through the closing machine

continuous small amount of moisture to keep their resilience, will not subject the steel strands to the possibility of deterioration by rust from that source.

Strength and toughness are uniform throughout the length of the plastic core, including the joints which have been spliced under heat. But because hemp is vegetable matter and is affected by the conditions under which it is grown, the fibers continually vary in physical characteristics. Fiber core joints, being mechanically made, are often weak spots.

Manufacture

In manufacturing the wire rope cable, the plastic core is first extruded to close tolerances. It is then fed, together with six steel strands through a closing machine which forms the strands under pressure around the core. This pressure reduces the diameter of the plastic core about 30%, and the final diameter of the core usually represents about $\frac{1}{3}$ of the finished diameter of the cable.

Normal diameters of drilling cable are $\frac{3}{4}$ in., $\frac{7}{8}$ in., and 1 in., but special sizes may also be manufactured. The length of the cable can run up to 40,000 feet.

Evolution of the Hobby Horse

Two-part butyrate molding replaces wood, introduces realistic design, and reduces assembly and finishing operations

EVOLUTION of the horse required millions of years. In marked contrast, the evolution of the juvenile hobby horse from wood to plastic construction, made possible by improved plastic materials and high-capacity injection machines, was accomplished in only two years. The results of this transition have been gratifying both to the hobby horse set and to the manufacturer—Wonder Products Co., Collierville, Tenn.

The new De Luxe Wonder Horse is a spirited palomino supported by four sturdy springs suspended from a hardwood frame. It supplements a wooden model, making possible a new concept of realistic design and bringing to this large toy the advantages of mass production and reduction of assembly and finishing operations. Except for the wooden frame, footrest, handgrips, and outriggers which secure the horse to the coil springs, the entire toy is molded of Tenite II cellulose acetate butyrate. It is composed of two matching halves which are cemented together to form a remarkably sturdy product. Although the horse is designed for children from one to six years of age, it will support a 200-lb. man without damage.

Largest Yet Molded

The body of the horse, injection molded by Ger-Ell Mfg. Co., Chicaco, Ill., is said to be the largest item thus molded of this material up to the present time. The two halves, produced simultaneously in a two-cavity mold, contain a total of approximately 5½ lb. of medium-flow ivory butyrate; weight of the complete shot is over 6 pounds. The assembled body measures approximately 28 in. from the top of the head to the bottom of the rear hooves, 34 in. long from front to back, and 10 in. wide through the middle. Average wall section is about ⅛ inch.

In cooperation with Wonder Products Co., Ger-Ell Mfg. Co. engineered the entire project over a period of two years, from the original clay model through the molding job. Before tooling up for this pioneering application of plastics in the large toy field (which suggests possibilities

Sturdy hobby horse body, capable of supporting up to 200 lb., consists of two matching halves molded of butyrate and cemented together

Courtesy Eastman Chemical Products, Inc.

3 **Total weight of the shot which simultaneously produces two matching halves of the hobby horse at each machine cycle is about 6 lb.; more than 20 shots are run per hour**

Courtesy Ger-Ell Mfg. Co.

of complete miniature auto and wagon bodies made by the same process), Ger-Ell officials fabricated preliminary mock-ups from acrylic, acetate, and Royalite copolymer sheet. Tests with the full-size models indicated that the molding of the body was economically feasible, and the program received the go-ahead signal.

Mold Weighs 5 Tons

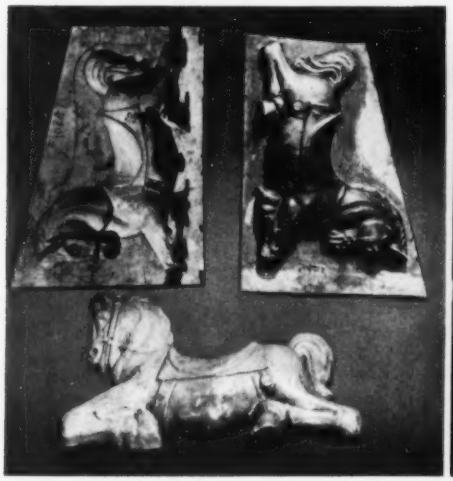
The two-cavity mold, under construction for a period of seven months, was built by Enduro Tool & Engraving Co., Chicago, Ill. The finished mold, measuring 40 by 55 by 18 in., weighs more than 10,000 pounds. Crucible Steel's CSM-2 steel was used in its construction.

A plaster cast was made by H. & H. Specialty Co., Chicago, Ill., from the original clay model, also produced by H. & H. The cast was used to guide the Cincinnati Hydrotel machine on which the cavities were cut. Pours were then made into the finished cavities and duplicated to produce the cores. Sheets of wax were successively introduced between the cores and cavities to test the fit and arrive at the desired wall thickness. Accurate die work was necessary to attain close match of the two sides and registration of the 26 strategically spaced studs and cores which fit together to form a strong assembly.

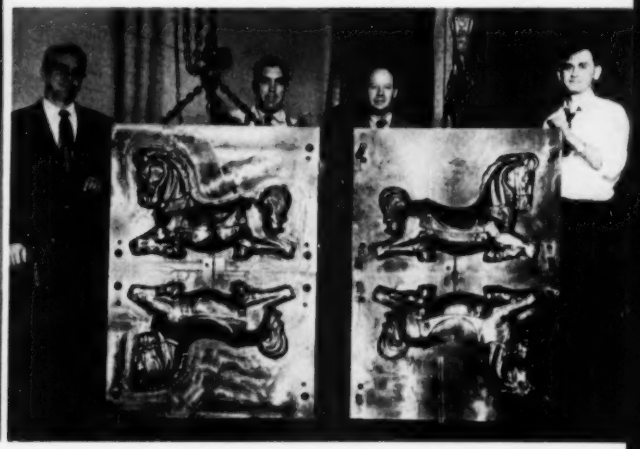
Originally the mold was designed with one central sprue and a single runner leading to edge gates at the belly section of each body half. The gating has now been modified to incorporate a hot runner system, making it possible to gate each half at approximately the center of the piece, improving the cycle and providing more uniform distribution of material. This minimizes the possibility of short shots.

In changing over to the hot run-

1 Female plaster mold (top, left) made from original clay model (bottom) was used to produce the positive cast (top, right)

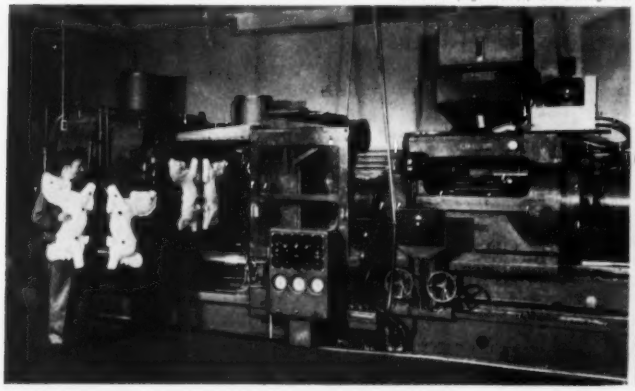


2 By using the plaster positive cast as a guide in cutting the cavities of the mold, all details of the original clay model were reproduced. The completed steel mold measures 40 by 55 by 18 in. and weighs more than 10,000 pounds. Central gating and a hot runner system were later added

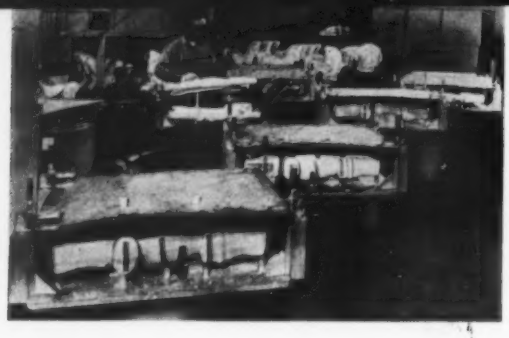


4 Injection machine for molding the parts has a maximum clamp pressure of 1500 tons. Platen area measures 60 by 72 in. and stroke of the injection plunger is 21 inches

Photos this page courtesy Ger-Ell Mfg. Co.



5 Before assembly, edges of one half of horse body are soaked in a tray of solvent cement



6 Assembly of the hobby horse is handled in six wooden jigs fitted with toggle clamps. Molded studs in right half of body engage cores molded-in left half

ner system of molding, an auxiliary chamber was built for the back of mold, equipped with its own Thermel electrical heating elements. A sprue bushing enters this chamber and runners lead from it to the two mold cavities. The chamber is insulated with Transite to prevent heat from migrating from the chamber to the die and to prevent heat loss from the chamber, which is kept at the same temperature as the plasticizing section of the injection machine. In the auxiliary chamber, the material in the runners is kept in a plastic condition, always ready for the next shot.

The injection machine on which these parts are molded, built by Reed-Prentice Corp., is nominally rated at 60 ounces. However, it has handled this and other heavy-part jobs, such as toilet seat and lid combinations, in the 90- to 100-oz. range.

Twenty Shots Per Hour

Closely regulated independent temperature control of forces and cavities is obtained by means of a Sterlco mold temperature control unit. The complete shots, including both sides of the horse, are molded at a rate of more than 20 shots per hour, with a very low reject rate. Molding on a 24-hour schedule, the plant can turn out approximately 500 completely assembled horses per day, ready for the final painting operation which produces the desired palomino effect and brings out such details as the eyes, hooves, and saddle.

The two halves which form the body of the horse when assembled are designed with butt jointed edges which provide a liberal bonding area for the cement. In addition, 26 mating studs and cores spaced around the outside edge of the halves, and concealed on the cored side of the moldings, lock the halves in exact position during assembly and provide an even stronger finished joint. Four molded-in holes provide for the mounting dowels.

Solvent Cement

Upon removal of the parts from the press, the sprues are clipped and the halves are separately stacked in lefts and rights to eliminate the need for sorting them in the assembly department. No cooling fixtures are required. The only finishing required prior to joining the halves consists of milling off the gates. Prior to the assembly operation, each right half of the horse is placed edge downward in a shallow galvanized pan containing a solvent type cement, where it is allowed to remain for three minutes before it is removed and clamped in a wooden jig in contact with a left half. The soaking pan, whose shape closely conforms to that of the horse outline, permits an important saving in the amount of solvent required; an "island" in the center of the pan reduces the amount of solvent to a minimum. By cutting down on the amount of solvent exposed to the air, evaporation losses are greatly reduced.

Actual assembly of the horses is handled in six wooden jigs fitted with De-Sta-Co toggle clamps. Rubber-padded dowel pins in each half of the jig insure contact with the curved contours of the plastic parts at a number of strategic points, bringing the halves into firm contact when the clamps are closed. Upon removal from the jigs, the assembled horses are hung on racks by means of a length of pipe passed through the foot-rest opening. The toys are allowed to remain on the racks for 24 hr. before the cemented joint is milled to a smooth finish. Held on turntables in a vertical position, the horses may be turned to any desired point to provide easy access for the milling tool.

Complete Inspection

The final operation performed before the horses leave the Ger-Ell plant consists of hand touch-up and complete inspection. At this stage, the cemented joint between the two halves is carefully checked for a sound bond and minor imperfections in the molded parts are eliminated by means of a filling compound consisting of butyrate in a solvent solution. The palomino coloring, developed by Janeen Art Studio, Inc., Chicago, Ill., is applied by air brush under that studio's direction. Butyrate lacquers used for this work are produced by Midwestern Color Works, Chicago, Ill., and Minneapolis, Minn. The finished plastic bodies are then shipped to the manufacturer for final assembly and packing.

7 To facilitate finishing of cemented joints, assembled horses are mounted on rotary fixtures that can be turned to any desired position

8 After a thorough inspection, completed hobby horses are touched up by hand. Palomino coloring is later applied by air brushing

Photos this page courtesy Ger-Ell Mfg. Co.

Improving A Dictating System

Molded butyrate components of streamlined, functional dictation machine (left), above) include tape magazine cover, front escutcheon plate, and circular indicating dial. In operation, the unit can serve either as a recording or as a transcribing machine (above)

FROM the standpoint of appearance and functional operation, plastics have contributed much to the development of business machines from the oversized, awkward units of yesteryear to the compact, streamlined equipment of today.

For example, the new Permoflux Scribe dictation machine produced by Scribe Corp., Chicago, Ill., makes efficient use of plastics, and uses them attractively.

The Scribe machine, which is approximately the size and shape of a typewriter, employs as the recording medium a magnetic tape that may be used over and over again without impairing tonal quality and requires no supplementary processing. As each new message is dictated to the tape, the old one is automatically erased. The machine is engineered as a specially designed dictating system, offering both recording and transcribing in a single instrument.

Plastics Parts

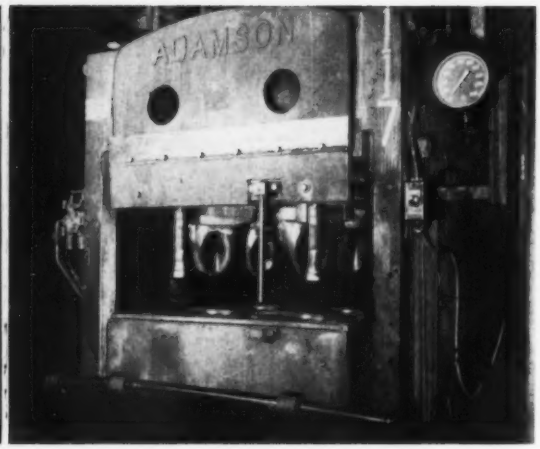
In addition to the cellulose acetate recording tape and the styrene reels on which it is supplied, there are three important plastics components —the front panel or escutcheon plate; the snap-on cover for the removable tape magazine; and the circular indicating dial. All three are injection molded of cellulose acetate butyrate by Continental Plastics Corp., Chicago, Ill. Both the escutcheon and magazine cover are produced in a single cavity mold on a 16-oz. injection machine.

The front escutcheon, approximately 6 by 10 in. in size, is molded of clear transparent butyrate and finished on the underside in grey to match the snap-on cover. Lettering is intaglio molded in the back of the piece and filled with gold lacquer before the grey background color is applied.

Three molded openings near the top of the escutcheon accommodate volume and selector control switches and the dial-type indicator. The escutcheon is also molded with a series of horizontal grooves, a speaker grille formed by 96 rectangular openings, and an opening near the bottom of the right hand side for a transparent "bull's eye" which flashes on and off to indicate

(*Continued on p. 212*)

Special resin-rubber compound is placed by press operator in one of the four cavities used in the molding of a football helmet shell



By designing involutions in the shell, the force plugs of the compression press can be inserted and withdrawn without use of a split female cavity

First Mold It:

HELMETS are important to football players. They are equally important to the plastics industry because the development of a new helmet shell has been made possible by the use of a plastic-rubber material and a new molding technique which can conceivably be applied to many other products.

The high-impact material combines the firmness of plastics with the toughness and flexibility of rubber. The reinforcing resin is Goodyear's high styrene-butadiene Pliolite S-6; the rubber is GR-S. The properties of the compound are uniquely suitable to the physical demands of football helmets; the two-step production process developed after years of research has far-reaching implications in other fields.

Briefly, the molding of the new helmet is accomplished by compression molding a shape in which undercuts are eliminated by designing involutions in the front and back of the shell. The helmet, on removal from the mold, is re-formed to its finished shape in a split mold under rubber-bag pressure.

Statistics compiled over a 17-year period revealed that 69% of fatal football injuries resulted from blows on the head. Wilson Athletic Goods Mfg. Co. had studied the multitudinous problems involved and means of correcting them. Extensive experimental work with various materials was carried on. Then Wilson joined up with The Goodyear Tire & Rubber Co. in a pooling of technical know-how which resulted in the development of the rubber-plastic helmet shell now used in the RP football helmet. At a later date, Rawlings Mfg. Co., another major supplier of football helmets, joined the venture.

A fundamental analysis of the problem of head protection in football is extremely difficult since only approximate methods of measuring the force of the maximum blow have been developed.

It is known that the helmet must absorb as much of the blow as possible and then uniformly spread the remainder of the blow over the largest possible area of the head at the slowest possible rate. This must be done to avoid a jolt—which actually is a sudden and severe change in either the direction in which the head is moving, its velocity, or both.

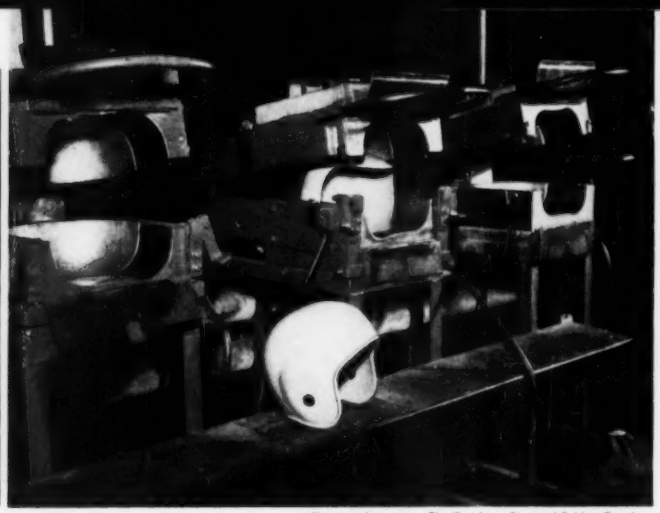
Energy Absorption

Helmets must be constructed of a material which absorbs a major portion of the energy and then transmits the remainder to the head at a relatively slow speed. The ultimate aim narrowed down to this: a helmet material which would be sufficiently hard to afford protection, yet which would be resilient and flexible enough to absorb shock; a helmet that would protect the wearer and yet would not be a potential lethal weapon against his opponent.

The material finally selected was a high-impact compound incorporating Goodyear's high styrene-butadiene rubber reinforcing resin. Typical physical properties of the helmet compound are as follows:

Specific gravity	1.16
Tensile	1500 p.s.i.
Elongation	250%
Shore B	86
Shore D	60
Notched impact	in excess of 11.0 ft.-lb./in.
Softening point	150° F.

This combination utilizes the firmness of plastic, along with the proper quantity of rubber necessary to toughen the final mixture and still impart sufficient flexibility for shock reduction. The rubber also toughens the mixture to a point where the compound retains this durability down to 0° F.



Photographs courtesy The Goodyear Tire and Rubber Co., Inc.

After removal from the press, molded helmet is re-heated and placed in aluminum re-former mold

Helmet shell (foreground), re-formed to finished shape under pressure from rubber bag (lower right), is removed from mold when temperature is lowered below heat distortion point

Then Re-form It

Revolutionary molding technique used to produce parts with undercuts in special plastic-rubber material

by J. C. Havey,* Frank Fetter, and C. O. McNeer****

The padding of the new helmet consists of two types of sponge rubber: cellular sponge which will not become completely flattened under a severe blow; latex foam which permits the helmet to readily adjust itself to various head shapes and absorb an additional amount of energy.

Production

After the resin-rubber compound was developed for the helmet shell, production was started with single cavity split steel molds. Then increased demand called for increased efficiency. As a result, Goodyear engineers developed a 4-cavity mold which necessitated neither splitting of the mold nor the need for a collapsing mandrel. The new design permits the mandrel or force plug to be inserted and removed freely because of the involutions in the shell.

The heat distortion point of the compound is such that the finished piece will withstand stresses of cured memory above temperatures to which the helmet may be normally subjected. Hence the out-of-shape molded shell can be brought to proper shape by heating and re-forming it in a cavity designed to produce the proper head size.

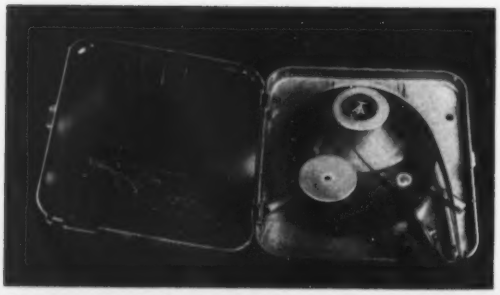
The initial molding process is carried out at a temperature of 340° F. and a pressure of 2000 p.s.i. Cure time in the press is 18 minutes. The molded shell is preheated to 200° F. before it is placed in the re-forming cavity. Re-forming pressure is 15 p.s.i., temperature of re-forming cavity is held at 65° F., and cooling time in the cavity is 2 minutes.

This new molding technique is revolutionary in both the plastics and the rubber industries. It has improved quality of the shells and has cut operating costs considerably.

* Wilson Athletic Goods Mfg. Co.
** The Goodyear Tire & Rubber Co.

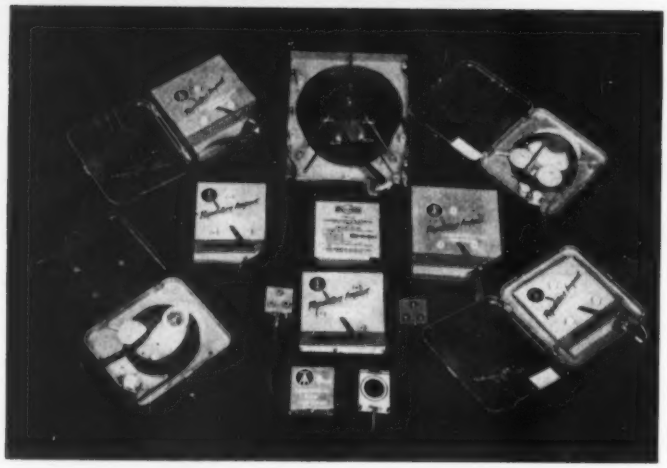
Football helmets (above and below) are produced by two different manufacturers using shells molded of rubber-plastic material by new technique. These helmets are hard enough to give protection, resilient enough to absorb shock

Plastics in a Film Magazine

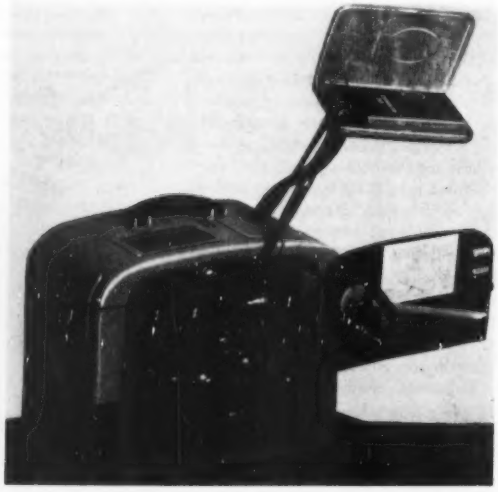


Continuous film magazine incorporates two molded nylon rollers around which the loop of film winds. The cover is molded of styrene

Photos courtesy Television Associates, Inc.



Film magazines and cartridge loads are available in a wide variety to meet different requirements. Same type of unit is used for continuous presentation of either film or tape recordings



In use, the magazine is mounted to extension arm of movie projector. Film is withdrawn continuously and simultaneously rewound

CONTINUOUS film magazines that incorporate three types of molded plastics—styrene, nylon, and phenolic—in their construction, are designed both to eliminate bothersome rewinding and threading and to keep the film clean and protected.

The continuous film magazines and cartridge loads are produced by Television Associates, Inc., Michigan City, Ind., in a wide variety to meet different requirements. Using one of these magazines, a projector can be put into action immediately and will repeat the presentation continuously until it is shut off. This feature is particularly useful with films prepared for sales promotions, safety campaigns, and window displays. Magazines of this same type are also made for tape recorders that can repeat a message as long as desired.

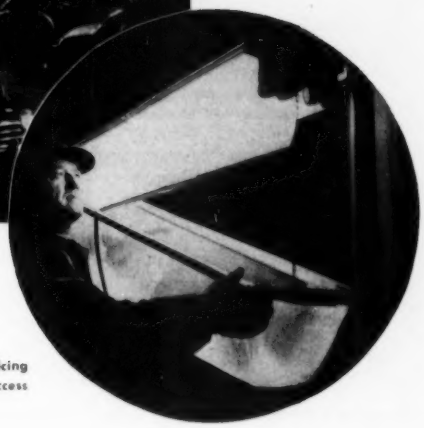
The styrene outer case of the film magazine is clear, rigid, and will resist warping. It is conveniently hinged so that, when used in conjunction with a metal lower section, it facilitates access to the film. The transparent styrene also permits the film to be always in view, thereby assuring trouble-free operation.

Each of the film magazines and cartridge loads incorporates rollers which provide rotation for the film loop. Film returning from the projector is taken up on the outside of the coil at the same rate that film is withdrawn from the center of the coil to be fed to the projector.

The disks and rollers on which the film is wound were originally molded of nylon because of its smooth surface and its superior resistance to abrasion by film or magnetic sound tape. Most of the parts, however, could not be molded in one piece and the bonding of two or more nylon components presented a serious problem. Accordingly, many of the interior rollers are now being molded of high impact phenolic, which has shown satisfactory abrasion resistance and lends itself more readily to cementing operations.

Styrene case components for the film magazines are molded by Niles Corp., South Bend, Ind.; the molded nylon and phenolic parts are supplied by Thorgren Tool & Die, Valparaiso, Ind.

Two street lighting fixtures are mounted on each 30-ft. pole; each fixture has a two-part acrylic globe enclosing 6-ft. fluorescent tubes



Light weight of acrylic globes is a distinct advantage when servicing fixtures. Globes are hinged at one end, latched at other, for easy access

More Light on Highways

Excellent light transmission and diffusion of molded acrylic globes on new fluorescent fixtures assure maximum illumination with minimum glare

BETTER highway and street lighting is recognized as one of the most certain methods of reducing the nation's appalling total of approximately 38,000 traffic fatalities per year. Destined for an important role in future improved lighting programs is a new type fluorescent fixture developed by General Electric Co., having a two-piece molded acrylic shield or light-diffusing globe which contains approximately 16 lb. of the plastic material. The individual halves of this clear transparent enclosure, molded of VM-100 Plexiglas, are said to be the largest pieces thus far injection molded of acrylic.

Known as the GE Form 206 luminaire, the new fixture was designed for use with a 6-ft. new type fluorescent tube perfected by General Electric expressly for outdoor use. Unlike conventional fluorescents, these tubes do not lose illuminating efficiency at reduced temperatures. Their light output remains virtually unimpaired even when exposed to temperatures as low as 0° F. Measuring more than six ft. in length when fully assembled, the Form 206 luminaire provides a large, low-intensity source of light which covers a broad area and reduces glare to a minimum. This type of lighting is particularly desirable in eliminating reflections and glare from wet pavements.

Up to the present time, the new type luminaires have been installed in three U. S. cities—Lyndonville, Vt., a town of about 1,500 population; a section of a Detroit business area; and in Oakwood, Ohio, a suburb of Dayton. Largest installation made to date, the Oakwood project involves 50 of the king-size fluorescent fixtures mounted on 30-ft. poles. This installation marks the most recent achievement in this specialized branch of illumination engineering. Due to the large area, low intensity light emitted by these new units, the traffic area where they are installed is flooded with broad bands of light that merge with one another, producing a remarkably uniform illumination.

The trough-shaped plastic parts for the new fixture are molded by the Plastics Div., General American

Photos courtesy Rohm & Haas Co.

Acrylic parts for large street lighting fixture globes weigh 8 lb. each, are produced at a rate of 22 shots per hour

Sprue is milled off center gated globe piece. Four assembly holes are then drilled in the closed end by the multiple spindle drill at right

Transportation Corp., Chicago, Ill., which, also made the die and, working in close cooperation with General Electric lighting engineers, developed the ultimate design of the transparent shield. Measuring approximately 37 by 13 by 12 in. in size, the acrylic components are molded on a 300-oz. Watson-Stillman injection machine equipped with pre-plasticizer, a B. F. Gump Co. weigh-feeding device, and a mold temperature control unit. Rate of production is 22 shots per hour. Molding is done with a 1500-ton clamp pressure and 1900-lb. line pressure.

The identical halves which make up the plastic shield have an average wall thickness of approximately 0.190 in. and are produced in a single cavity center gated mold. Upon removal from the molding machine, the parts are placed upon a felt-covered wooden cooling fixture which prevents deformation of the open end while cooling. In addition to milling off the sprue and light deflashing of the edge, the only post-molding operation performed by the molder consists of drilling four holes in the closed end of each piece for attachment to the metal base. These openings are drilled simultaneously by the machine operator on a multiple-spindle drill press.

The clear acrylic parts, which make up the light-diffusing portion of the fixture, are designed with closely spaced exterior ribs running parallel to the length of the part on the bottom surface and vertical interior ribs at the closed end. In addition to their light-diffusing function, these ribs facilitate the distribution of the plasticized material during the molding process. The relatively thin section of the shield also expedites flow of the material and filling out of the complete part, as well as eliminating any problem of air bubbles which might have been encountered in a large clear transparent piece having a thick section. The entire lip of the part is beaded for additional strength and rigidity.

Parts Joined Together

In the completed fixtures, which are produced by General Electric at West Lynn, Mass., two of the plastic parts are combined with their open ends butted together and secured by means of a U-shaped flat metal strip which seals and conceals the joint. Matching half-round openings in the end lip of the molded halves provide through holes for the attachment bolts when the parts are brought together. These openings are produced by a cam-actuated slide mechanism in the mold.

The Plexiglas shield is mounted to the metal housing of the fixture by means of a frame and gasket assembly which provides a dust-tight seal. A rigid metal frame around the outer edge of the plastic halves helps to combine them into a unified assembly. Fitted with a quick-opening closure at one end and hinged at the other, the shield may be conveniently dropped down so that the fixture may be serviced for lamp replacements and any other necessary repair work performed.

Construction features of the fixture include an aluminum housing, a polished aluminum reflector which takes the form of a double curve, and four of the new six-ft. fluorescent tubes—two on each side of the reflector. Ballasts and wiring are concealed in the housing beneath the reflector, while a streamlined cantilever bracket, attached to the top of the housing, shields the wiring and provides attachment of the entire fixture to the supporting pole. In the Oakwood installation, each pole carries two of the complete fixtures, involving some 32 lb. of molded acrylic per pole.

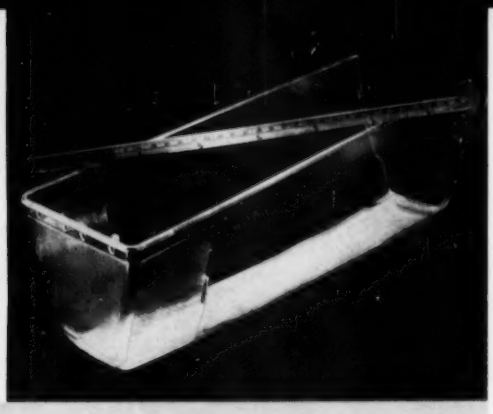
A primary function of the plastic shield is to cover the tubes, reflectors, and other parts of the assembly, sealing out dirt and moisture. Most important, however, is the fact that the transparent plastic globe, while affording excellent light transmission for maximum illumination, also protects motorists and pedestrians against the hazard of falling glass. Due to the strength and resiliency of the acrylic material, it can withstand severe impacts without breaking or shattering; even a bullet will commonly only puncture the material rather than produce a splintering effect such as occurs with glass.

Weight Advantage

The light weight of the acrylic is another advantage in this application, along with its ability to be molded to attractive, functional contours. If made of glass sections, each shield would weigh approximately 30 instead of 16 lb. increasing shipping costs and placing a heavier load on the supporting poles. The plastic material also successfully withstands

Courtesy Rohm & Haas Co.

Completed light fixture globes move down conveyer adjacent to presses, ready for packing. Note molded-in longitudinal and vertical ribs



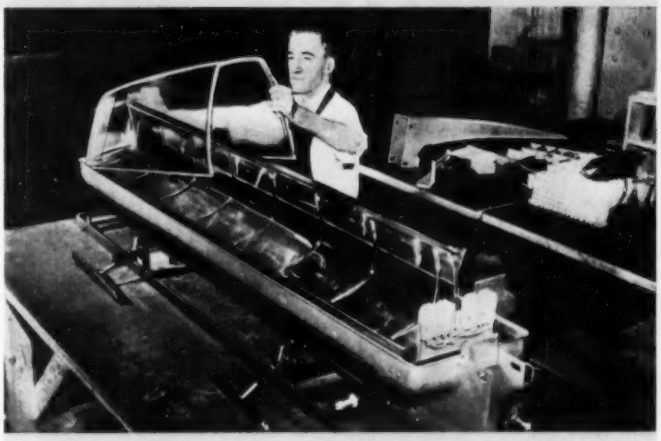
Yardstick indicates size of globe. Dimensions are approximately 37 by 13 by 12 in.; average wall thickness is 0.190 inch

weathering, resisting the deteriorating effects of sun, rain, heat, cold, or aging, and is not affected by the gases and chemical fumes often present in the atmosphere in and around industrial areas.

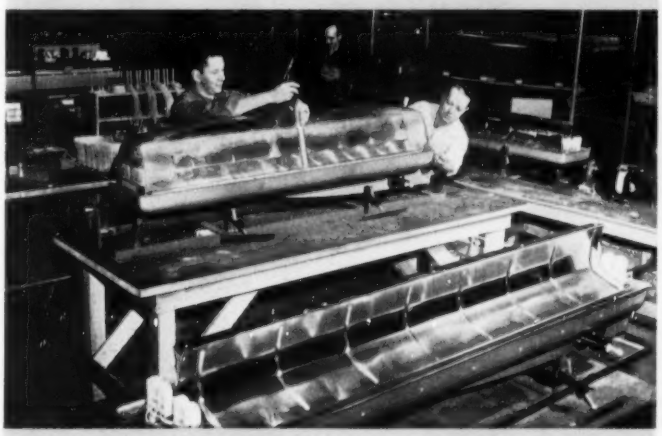
Dr. A. F. Dickerson, recently retired general manager of General Electric's lighting and rectifier department, West Lynn, Mass., believes that with the new Form 206 luminaire, the U. S. should gain world leadership in the fluorescent street lighting field—a position now held by Europe. Rugby, England, a city of 50,000 population, has 12 miles of fluorescent street lighting, and some 50 other English cities are also using fluorescents on their streets and highways. New-type fluorescents are expected to supplement, rather than supplant, incandescent and mercury vapor lights widely used for this purpose.

Reduced Insurance Rates

Statistics compiled by Dr. Dickerson for a number of years have revealed an unmistakable relationship between street lighting and traffic accidents. For example, on a section of street in San Antonio, Tex., only one-third of a mile long, 15 persons were killed in night traffic accidents over a certain period of time. After the same section had been adequately lighted, not a single fatality was recorded during a like period. Insurance companies report that the decrease in premium rates in cities that have done a thorough street relighting job can easily cover the complete cost of the new installation in a relatively short time.



Fitting first of the two acrylic parts of the globe to the metal base. The "tombstones" which support the tube and make the electrical connections are molded of styrene



A U-shaped metal strap fits around the butt joint between the two acrylic globes. Bolts pass through holes formed by half-round openings molded in end lip of each piece

Zyl-Fashion Plastic

All photos courtesy Hercules Powder Co.

Decorative cellulose nitrate spectacle frames that are designed to complement the personality of the wearer range from the rugged glasses (above) created especially for the businessman by Liberty Optical Mfg. Co. to the graceful, evening-wear frames (below) styled by Kono Mfg. Co.

FOR many years cellulose nitrate has been steadily in demand, primarily for its functional utility. It is tough, dimensionally stable, resilient, and easy to fabricate.

Today the emphasis has changed, or is at least divided. Dame Fashion has taken cellulose nitrate by the hand and the material—with its almost unlimited color and decorative possibilities—has entered the select world of high fashion.

Spectacle Frames

For zyl, as cellulose nitrate is commonly called when used for consumer applications, this growing awareness of decorative possibilities means the opening up of new markets and an increase in volume for those applications already in general acceptance. The latter is particulary true for spectacle frames, long a top market for zyl.

Stimulated by the intriguing patterns and colors developed for zyl by such companies as Nixon Nitration Works, Nixon, N.J., the ophthalmic industry has pioneered a trend towards popular acceptance of beauty and individuality in corrective glasses.

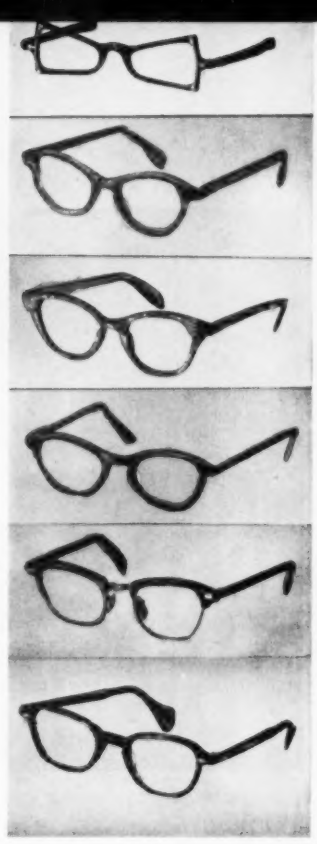
The result has been a large volume increase in the sale of glasses. In 1948, only 10 million frames were sold per year. Today, 18 million frames for corrective glasses are marketed annually. According to the Better Vision Institute, half of this number are all-nitrate frames, and 40% are constructed partly of plastics.

Corrective eyeglasses are no longer considered an "optical crutch" to be furtively slipped on or off. The new versatile zyl frames are smart, sophisticated, and especially styled to complement the personality of every age group—men, women, teen-agers, or children—in any of the social, business, and recreational activities of the day or evening. It is not uncommon for the modern wearer of eyeglasses to own several pairs to be worn for different activities.

Sunglasses and Handbags

Two other products, virtually at opposite ends of the "high fashion" scale, are serving as popular markets for zyl—sunglasses and handbags.

Almost every sunglass frame is made of plastic and zyl is said to be used in well over half of the



Colorful patterns and a wide variety of styling possibilities of zyl are used in frames designed for children by Ward Mfg. Co. (above) and for adults (right, top to bottom) by Kano Mfg. Co.; Zylite Products Co., Inc.; Victory Optical Mfg. Co.; Art Craft Optical Co.; Shuron Optical Co., Inc.; and American Optical Co.

higher priced, better quality models in this field. The majority of sunglasses are used during recreational activities, and the colorful and striking patterns that can be created with cellulose nitrate readily complement informal attire and atmospheres.

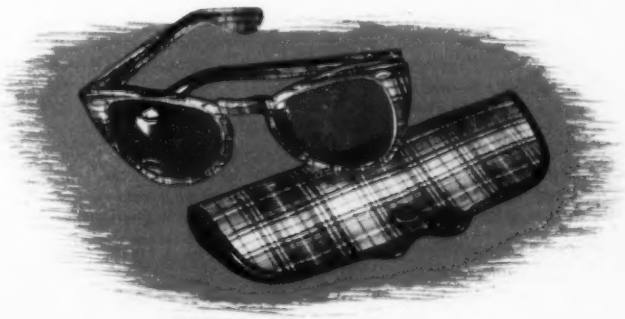
In fabricating handbags from zyl sheet stock, manufacturers are particularly attracted by the unusual decorative effects and the physical properties of the material. The handbags are ideal for formal evening wear. They are light in weight, virtually unbreakable, and won't warp or crack. The luster of the bags is permanent. The surface cleans easily with soap and water.

Patterns

Nixon Nitration Works, which also supplies a great deal of the zyl sheet stock for sunglasses and handbags as well as spectacle frames, maintains a continual research program for the creation of new color effects and patterns.

Innumerable effects are possible by simulating such surfaces as mother-of-pearl, tortoise shell, wood grain, ivory, marble, onyx, and even reptilian designs. Color can be solid or two-tone, mottled or rippled, dark or light, clear or opaque.

The potential for future decorative development lies in the wide choice of materials that can be laminated between nitrate sheets. Among those materials that have already been successfully used are silver foil, gold foil, fabric and colored fibers.



Plaid cloth laminated between nitrate sheets makes colorful frame for sunglasses by Bausch & Lomb Optical Co. Matching case is vinyl

Cocktail handbag is fabricated from nitrate sheet stock laminated with gold foil

Handbags by The Aberman Mfg. Co. and Simplex, Inc., utilize the many decorative effects possible with nitrate

TAPE BACKINGS

Courtesy Industrial Tape Corp.

White cloth tape, effectively protected against the weather by a waterproof coating of plastics, is used to seal chemical flare canisters

NOTHING is impossible in the pressure-sensitive tape industry—at least not if the plastics industry has anything to say about it.

The "age of plastics" and the "age of miracles" have arrived simultaneously on the tape scene.

Ten years ago, for example, anyone who knew anything about tapes would have considered it a virtual impossibility to make a cloth or paper-backed tape that for all practical purposes would be 100% waterproof. Today, three major tape manufacturers are turning out polyethylene-coated cloth tape by the mile to fulfill the requirements of a government specification calling for an almost-perfect weatherproof barrier.

By making such revolutionary product improvements possible, plastics have changed the entire outlook of the tape industry, particularly as far as paper and cloth tape backings are concerned. For these traditional materials, plastics have opened new horizons in application and sales possibilities.

Plastics, in either of two forms—as a coating material or as part of a bonding adhesive to hold reinforcing filaments in place on a tape backing (which may be paper, cloth, or plastic)—offer the specific additional properties that enable the paper or cloth tape to better meet the ever-growing and complicated demands of industry.

Plastics Coatings

Some of the present plastics coatings have been used for several years; others are comparatively new and just beginning to show evidence of a dramatic impact; still others are going through the experimental stages that precede the development of a new tape or the improvement of an existing one.

But new or old, the coated tapes have established themselves as an important, expanding market for plastics of all types. Vinyl, nitrocellulose, and polyethylene have already captured the greater share of this market—and backed by the continuing research programs of the tape industry appear competent enough to hold it for many years to come. Acrylic and urea-alkyd resins, although used in smaller volume, have also carved a slice of the business for themselves. Acrylic is used in the form of an acrylic-vinyl combination coat that is claimed to have an attractive high sheen, nonstaining qualities, and better stabil-

The lead article in MODERN PLASTICS last month discussed two important phases of plastics in pressure-sensitive tapes—as backing, either alone or laminated to paper, and in the formulation of the adhesive mass.

Equally important as a market for the plastics industry are the tapes described in the accompanying article. These tapes effectively use plastics as a treatment for cloth and paper backings as well as in the bonding of reinforced tapes.

In both aspects, plastics have much to offer. The versatile properties of plastics coupled with the practicality of the pressure-sensitive tapes are opening possibilities for an extensive expansion in the industrial, as well as the consumer, fields.

BACKED UP BY PLASTICS

ity than vinyl alone when exposed to ultra-violet light; urea-alkyd is used as a practical waterproof coating for paper tapes.

The value of each type of coating lies in its ability to offer a particular advantage designed to meet the requirements of a specific application. With polyethylene, it is an exceptional moisture vapor barrier. The water vapor permeability of a polyethylene-coated tape runs less than 1 g./100 sq. in./24 hours.

The less expensive vinyl and nitrocellulose coatings, although not quite comparable to polyethylene as a moisture vapor barrier, are still far superior to most other waterproofing treatments.

Plastics coatings do much to improve the performance of paper or cloth tapes by contributing resistance to high temperature aging and chemicals, good abrasion resistance, and the ability to remain flexible at varying temperatures.

By adding a plastics coat, the tensile strength and the resistance of the tape to all types of rough weather and deteriorating elements are increased.

The handsome, shiny surface of the plastic coating is as attractive as it is functional. In unwinding the tape from the roll, the smooth coat minimizes the possibility of the adhesive mass picking up bits of lint from the cloth backing directly beneath it on the roll. A tackier, more practical adhesive can therefore be used without fear of too many cloth fibers being torn loose to affect the appearance and efficiency of both the backing and the adhesive mass.

When the tape is to be colored for a specific packaging or identification application, either the fabric is dyed to the required color and a colorless coating laid over it or pigments are added directly to the plastics coat. Polyethylene-coated tapes are colored by the first method; vinyl- and nitrocellulose-coated tape can be colored by either method as the manufacturer may select.

Government Packaging

Most of the plastics-coated tapes were specifically developed for use in the packaging field and this type of application continues to be the largest market.

The bulk of the packaging tapes eventually find their way into jobs that have to conform to government Military Specification JAN-P-127 for pressure-sensitive tapes to be used in packaging for overseas shipment. The requirements of this specification generally determine the type of coating.

JAN-P-127 pressure-sensitive tapes are used in packaging products that will be stored on board ship; in sealing equipment, such as guns or tanks, which are to be shipped unboxed; and in waterproofing equipment being prepared for amphibious operations.

Tapes submitted under the specifications of JAN-P-127 are classified according to type of backing and the effectiveness of the moisture vapor barrier. In the category that deals with type of backing material, there are four general classifications. The first of these—Type I—covers treated cloth-backed tapes having a high strength and maximum resistance to exposure to rough weather, sun, salt spray, and oil. The other three types cover plain cloth backings, other backings of medium strength, and other backings of light strength.

Each type of backing is further broken down into three separate grades, based on their moisture vapor transmission rates. Grade A tapes have a high water resistance; Grade B tapes, medium; and Grade C tapes, relatively low.

Meeting the Specifications

The tapes that most successfully have met the rigid qualifications of the two superior classifications of JAN-P-127 tapes—Type I, Grade A, and Type I, Grade B—are the plastics-coated tapes.

The result of the many years of research devoted to meeting the "impossible" requirements of Type I, Grade A tapes was the dramatic development of the polyethylene-coated tape. The extraordinarily low M.V.T. rate of the coating coupled with its many other qualities of durability and attractiveness make it suitable for rugged packaging jobs.

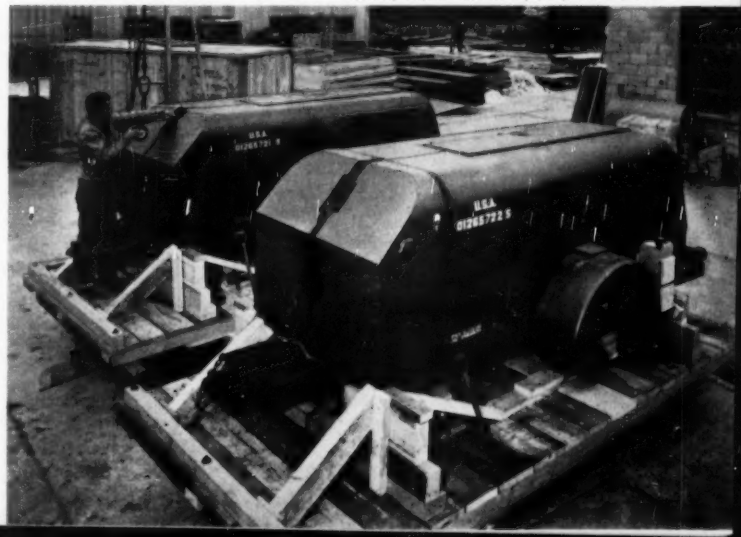
The three companies that are producing such tapes are Industrial Tape Corp., New Brunswick, N.J.; Polyken Industrial Tape, Dept. Bauer & Black, Chicago, Ill.; and Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago.

Most Type I, Grade B tapes are prepared by coating the cloth backing with vinyl or nitrocellulose and are intended for those packaging applications where a medium M.V.T. rate is sufficient.

Manufacturers of plastics-coated

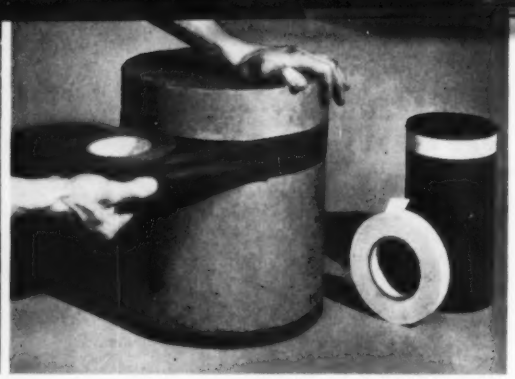
Polyethylene-coated tape—durable, attractive, and virtually waterproof—meets government specifications for packing Army mobile shower units for overseas shipping

Courtesy Polyken Industrial Tape, Dept. Bauer & Black



Courtesy Industrial Tape Corp.

Heater wires, designed to keep windows in freezer units frost free, are covered with a polyethylene-coated tape to stop moisture condensation



Courtesy B. F. Goodrich Chemical Co.

Easy-to-handle vinyl-coated packaging tapes, available in dark or light colors, will resist abrasion, high temperature aging, and chemicals

tapes in the Type I, Grade B category include Polyken Industrial Tape, Dept. Bauer & Black; Industrial Tape Corp.; Mystik Adhesive Products; Hampton Mfg. Co., New Rochelle, N.Y.; Technical Tape Corp., Bronx, N.Y.; and Van Cleef Bros., Inc., Div. of Johns-Manville, Chicago, Ill.

Industrial Applications

Not all of the plastics-coated tapes are absorbed by packaging applications that fall under Government specification. The private industrial uses are many and give every indication of increasing as more potential users become aware of the advantages of these tapes.

In any phase of industrial activity where moistureproof sealing is of major importance, the plastics-coated tapes have a role to play.

They are also used in weatherproofing trucks, waterproof-sealing railway cars and automotive doors during fabrication, and sealing mail cars.

Plastics-coated tapes are finding application for splicing operations where the tape would have to undergo a process such as a bath. Typical of this use is the splicing of photographic film that has to be run through a chemical bath or water solution. In contrast to a plain cloth backing which might be affected by the solution and would shed lint that would adhere to the film, the smooth, slick surface of the coating keeps the tape intact throughout the process.

When colored, the coated tapes can be used for identifying pipes, wires, or cables. Since the tape will resist oils, chemicals, exposure to sunlight, and similar deteriorating elements, it is particularly suited for application wherever such elements may be present.

Application Developments

Coupled with the research activity being devoted to materials improvement by the tape industry is a developmental program aimed at bringing to light new applications for plastics-coated tapes.

The coated tapes are continually entering new industrial markets. A recent example is a vinyl-coated pipe wrap, called Dri-pipe, which marks the entry of pressure-sensitive tape into the specialized fields of cold storage plants, ice cream plants, etc.

This pipe wrap tape, a product of Mystik Adhesive Products, is available in a variety of widths up to 33 in. and incorporates a thick insulating mat—up to 30 in. wide—of wood pulp and cellulosic material bonded to the center of the tape. When wrapped around a cold water pipe, the combination of wood pulp insulation and the vinyl waterproofing eliminates condensation and dripping—a major consideration for home owners. Industrial users find the tape to be an excellent insulator for hot as well as cold pipes.

Another unusual application of plastics coatings is in the luminescent tape made by Century Coating Co., Long Island City, N.Y., for sealing or marking boxes and cartons so that they can be identified in the dark. The coating, which is a vinyl plastisol that is based on a Geon resin, serves to reduce fire and toxicity hazards for the tape and to offer moisture protection for the luminescent pigments added to the coating. The tape is passed through a spread coating unit six times to give it four base coats, a pigmented luminescent coat, and a clear 2-mil top layer.

Consumer Applications

Compared to industry and government packaging applications of pressure-sensitive tape, the consumer field has hardly been touched. And yet, although the amount of tape being manufactured for household use is relatively small, the variety of applications to which the plastics-coated tapes can be advantageously put makes a potential market that includes every household in the country.

Considering the fact that the tape can perform such diverse jobs as recovering worn venetian blind strips, repairing and binding books or magazines, reinforcing and repairing luggage, sealing and color coding the contents of boxes, and repairing gloves, raincoats and similar items, it seems surprising that this rich market has hardly been tapped.

The problem is one of education. The coated tapes are still new and in the minds of many consumers an unknown quantity that has to be proved.

To make the public aware of the advantages offered by the tapes is going to require an intensive promotional and merchandising campaign—with the consumer-appealing qualities of the plastics coatings as the major selling point.

Mystik Adhesive Products, one of the leaders in promoting plastics-coated household tape, has already found an eager market for its product. The Mystik tape is packaged in 13 different colors to blend with any of the household uses to which it

may be put. It is easy to handle, washable, durable, and easy to tear into strips.

The pressure-senstitive tape industry is convinced that the plastics-coated household tapes will soon be "big business." The day may be very near at hand when a roll of such tape will be considered as essential to the household as the ordinary bottle of glue.

Reinforced Tapes

The members of the family of high tensile strength reinforced tapes have only one thing in common—a series of reinforcing filaments bonded in place to the tape backing by thermosetting plastics resins in adhesive formulations. Otherwise, the reinforced tapes differ widely. The backings can be plastics films, cloth, paper and the backing may be treated or untreated. The reinforcing filaments can be glass, rayon, or nylon and the number of strands can be varied in accordance with the properties desired.

Some companies manufacture their own reinforced backings but others buy backings from companies such as Hess, Goldsmith & Co., Inc., New York, N.Y., and then lay on their own adhesive mass. In preparing the reinforced backings, Hess-Goldsmith first impregnates the base paper with Hycar (styrene copolymer) for additional tear strength and then coats it on one side with a latex formulation that permits the tape to unwind more easily. On the opposite side, threads of Fiberglas are carefully laid down in a pre-determined quantity. The number of glass strands per in. determines the final strength of the tape.

A bonding formulation, containing a thermosetting resin, is then coated over the strands and cured so that it no longer possesses any tack or adhesion. The strands are thus securely bonded to the paper backing and the pressure-sensitive adhesive mass can then be applied over it without undue difficulty.

Reinforced tapes are made by Polyken Industrial Tape, Dept. Bauer & Black; Industrial Tape Corp.; Mystik Adhesive Products Div., Chicago Show Printing Co.; Technical Tape Corp.; and Minnesota Mining & Mfg. Co., St. Paul, Minn.

Variations

Because of the different types of backings and filaments that can be used with the reinforced tapes, a wide range of properties and uses can be developed.

Minnesota Mining & Mfg. Co. uses an acetate film backing and rayon filaments. Due to the high mechanical strength of the rayon filaments, the tape is ideal for reinforcing packages. Because of the electrical properties of the acetate, a smaller quantity of the tape has found its way into applications such as anchoring the coil leads of small power transformers, as a replacement for the metal bands of TV deflection yokes, and as an outside wrapper on bobbin-wound solenoid coils.

Another product of Minnesota Mining & Mfg. Co. is a glass filament-reinforced acetate tape with a tensile strength of 500 lb. per in. of width—almost 10 times as much as the plain cloth backings.

Plastic-coated backings also add to the effectiveness of the reinforced tapes.

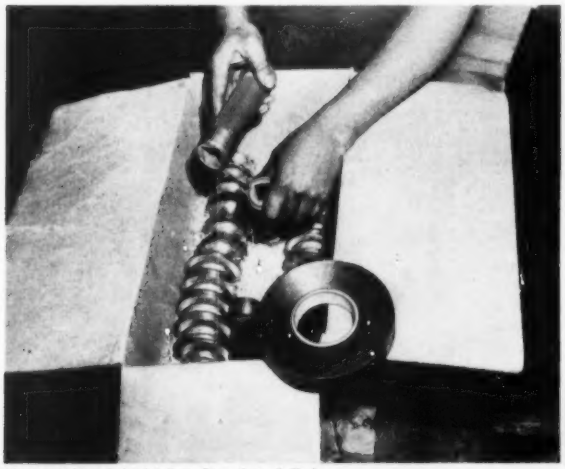
By the use of a polyethylene-coated cloth backing, Polyken Industrial Tape Dept., Bauer & Black, has successfully added to the high tensile strength of the reinforced tape a resistance to splitting and weather deterioration.

Applications

The possibilities of the reinforced tapes have greatly excited the imagination of all industry and many of the major tape companies are using the reinforced tapes as the foundation for building future merchandising plans.

For packaging applications in particular, the high tensile strengths of the reinforced tapes—from 180 to 500 lb. per in. of width—have a spe-

(*Continued on p. 215*)



Courtesy Polyken Industrial Tape, Dept. Bauer & Black

Use of polyethylene-coated reinforced tape, with tensile strength of 240 lb. per in. of width, is economical means of anchoring lathe parts inside carton

Courtesy Minnesota Mining & Mfg. Co.

Reinforced tape, applied to inside of cardboard carton during manufacture, cuts through wall when pulled from outside

PLASTICS

Adjustable lamp with handsome pastel-colored shade molded of heat-resistant Beetle urea, is adaptable for lighting kitchen, bedroom, bathroom, or hallway. Thumb screws, supplied with protective rubber inserts, are used to attach the unit to almost any surface. The lamp is made by Atlas Consolidated Corp., 298 Junius St., B'klyn, N. Y.

Housing, molded of Hercocel A cellulose acetate, contributes appearance and efficiency to portable food mixer. Attractively styled as a glossy finished one-piece molding, the shell is lightweight, resists staining by many foodstuffs, and serves to deaden the noise of the motor. The mixer is a product of General Electric Co., Bridgeport, Conn.

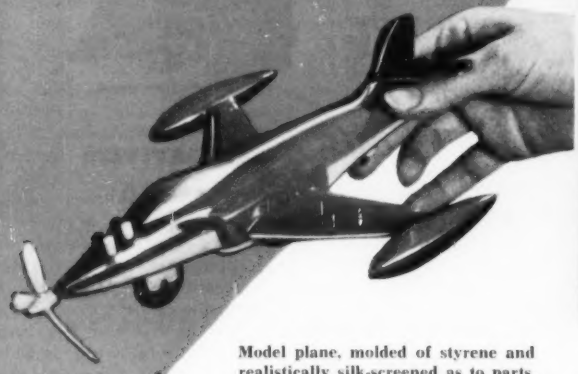
Recent addition to the expanding line of unbreakable Melmac tableware is a colorful set of utility dishes and a lightweight cup. The dish series includes a butter dish and two buffet platters of different sizes. A shallow recess molded into the base of the buffet platter will hold cups or tumblers securely in place. The tableware—in several kitchen pastel colors that can be mixed or matched—is available from Boonton Molding Co., Boonton, N.J.

Especially designed for the golfing enthusiast, a tough, tripod-like tee that stands firmly on three legs is made of flexible Bakelite polyethylene. The durable, resilient tee will resist abrasion, scuffing, moisture, and most soil chemicals and bounces away unharmed under the impact of a golf club. It is made by Pee Gee Bee, 1570 Northwestern Bank Building, Minneapolis, Minn.

PRODUCTS

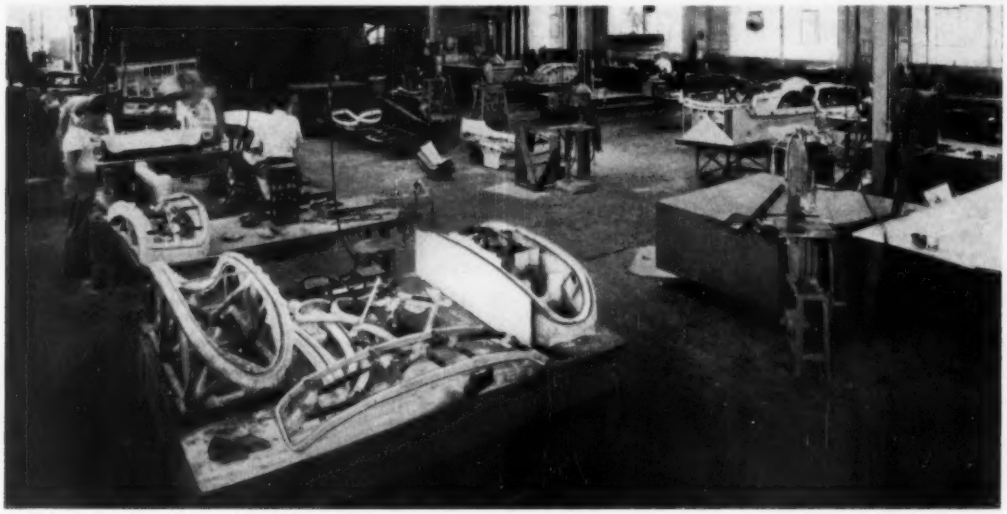
Flashlight, housed in durable red Tenite II cellulose acetate butyrate, and small adjustable reading light, with butyrate shade, mount on standard clipboards to provide working light in poorly illuminated places. Butyrate parts are molded by Flambeau Plastics Corp., 501-7th St., Baraboo, Wis., for Patent Development, Inc., 2902 S. Minnesota Ave., Sioux Falls, S. D.

Rugged, double-duty styrene roll cutter has three circular blades on one side for making clover leaf rolls and four parallel blades on the other for cutting fan tan rolls. Cutters are made in red by Kesco Plastics, 5614 Blackstone Ave., Chicago, Ill.



Model plane, molded of styrene and realistically silk-screened as to parts, is supplied with four brightly colored pop-up pistons that move alternately up and down and a propeller that twirls when the toy is pushed along the ground. It is made by Nosco Plastics, 17th and Cascade Sts., Erie, Pa.

Of major interest to packers using plastic or cellophane bags is a re-usable vinyl covered wire that makes a positive airtight closure with a twist of the fingers. The eye-appealing, colored ties are claimed to be moisture proof, fade proof, and dirt resistant. They are made by Plas-Ties Co., P. O. Box 27, Santa Ana, Calif.



All illustrations with this article courtesy Renaud Plastics, Inc.

General view of part of plant for the production of reinforced plastics tooling

Reinforced Plastics Tooling

REINFORCED plastics have made possible the development of new tools for the automotive, aircraft, appliance, and other industries. As built by Renaud Plastics, Inc., Lansing, Mich., these include die spotting racks, checking and inspection fixtures, and welding and assembly fixtures, as well as multiple duplications, all made from original models. Such plastic tools expedite and coordinate entire tooling programs . . . and reduce costs. The use of reinforced plastics, such as those made with Ren-ite (an epoxy type resin), has resulted in greatly reduced weight of new tools compared with conventional types and has simplified general tooling operations.

All reinforced-plastics dies, fixtures, and spotting racks are made up from wood models of sheet metal components, the wood model being used as a master. Basically, the operation consists of applying to the male model successive layers of glass cloth, each of which is impregnated with liquid resin before the next layer is laid up. This is continued until a thickness of approximately ⅛ in. has been obtained. First, however, before the glass cloth and liquid resin are applied, the model is coated with parting compound and wax for proper mold release.

After the resin has cured, a base is built for the plastics shell. Then the shell or mold is released from the model. As many duplications as required can be made from this mold, for use in manufacture, assembly, quality control, and inspection. The same mold, mounted on a suitable framework, may also be used as a die spotting rack and feeler. Sight-check holes may be cut through where required.

Reinforced plastics framework members used in building up base frames, including tubing, corners, T's, and centers, are stock Ren-ite items.

Spotting Rack

Spotting is an established practice in the die business, especially when large punches with compound contours are being made. The operation involves hand grinding and polishing in order to remove tool marks and bring the surface of the punch to exact dimensions and contour.

The spotting operation consists of coating the checking surfaces of the die spotting rack with what is known as a spotting compound. The rack is then placed accurately on the punch and pressure applied. After removal of the rack, any high spots on the punch will be found coated with the colored spotting compound. A skilled operator then proceeds to hand-grind these high spots. The spotting operation is then repeated and the remaining high spots are again ground. These operations continue until the spotting rack checking surface transfers a uniform coating of the spotting compound to the surface of the punch. This, of course, indicates that the contours of the punch have been brought in exact agreement with the reinforced plastics spotting rack.

The use of reinforced plastics for

* Reg. U. S. Pat. Off.

Fig. 1—Finished spotting die rack made of reinforced plastics

Fig. 2—How rack is used for spotting contours of die punch

Fig. 5—Fender welding fixture is similar to hood fixture

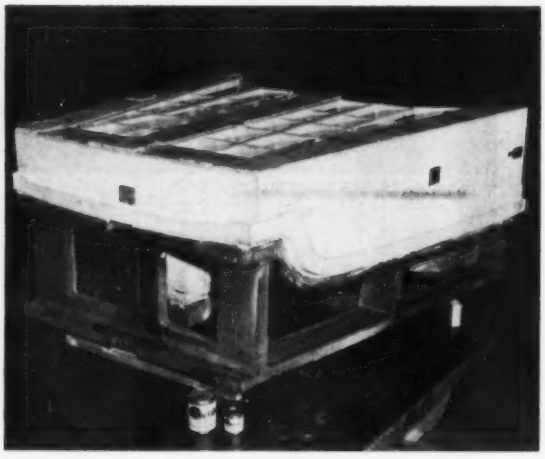


Fig. 6—Bonding of laminate to frame. Reproduction is on top

die spotting racks has greatly simplified this important operation. Figure 1 shows a finished die spotting rack made of reinforced plastics for use in making the punch for a truck cab back panel. Figure 2 shows the rack in position on the master wood model, simulating its use in spotting the contours of the punch to be finished.

Welding Fixture

A combination of a metal casting and reinforced plastics faces is being used in the production of various types of welding fixtures. By way of example, the various steps in the manufacture of a hood assembly and welding fixture are illustrated here.

The rough metal casting which will be used as the base frame of this welding fixture is shown in Fig. 3 and the finished fixture is shown in Fig. 4. It can be seen from the areas in white that only a small percentage of the areas of the hood model is reproduced in reinforced plastics. A fender welding fixture is shown in Fig. 5.

The manufacturing procedure involves making a plastics mold from an original model. This first mold is reproduced and the reproduction is backed up and reinforced with plywood.

First step in the production of the final fixture is to lay up tailored layers of glass cloth on the reproduction mold. Each layer is thoroughly impregnated with liquid resin before the next layer of cloth is applied. This process is continued until a thickness of about $\frac{1}{8}$ in. is reached. After the reinforced plastics lay-up has cured, a bonding paste of resin and fibrous glass is smeared on the faces of both the cured laminate and the cast iron frame. The two are then set together, making sure that they are level and in perfect relation to each other, as illustrated in Fig. 6. After the bonding layers have cured, the mold is removed, leaving the reinforced plastics securely bonded to the faces of the cast iron.

Clamps and air control valves are now mounted on the fixture (Fig. 7). Figure 8 is a front view of the fixture showing additional clamping cylinders as well as the controls and air tubing which are required for the operation of this fixture. Figure

Fig. 3—Rough metal casting used as base of hood welding fixture

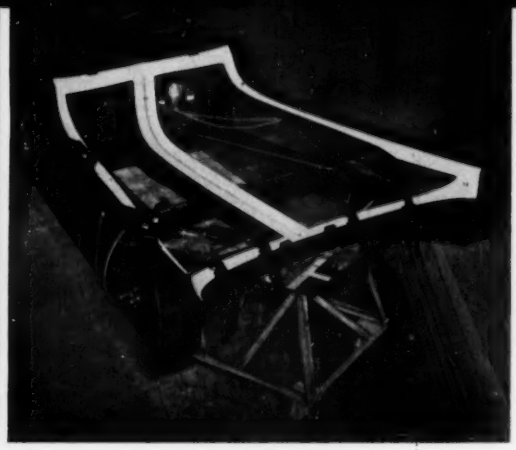


Fig. 4—Complete hood welding fixture. See Figs. 6 to 9

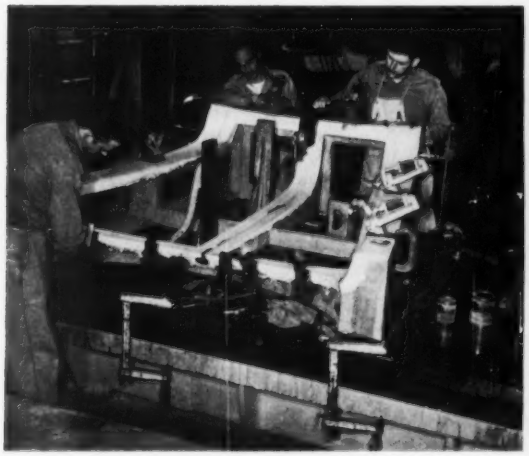


Fig. 7—Clamps and air valves are mounted on welding fixture

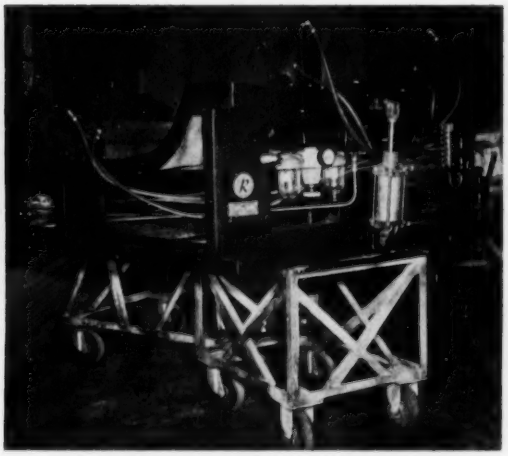


Fig. 8—Controls and air tubing for operation of welding fixture

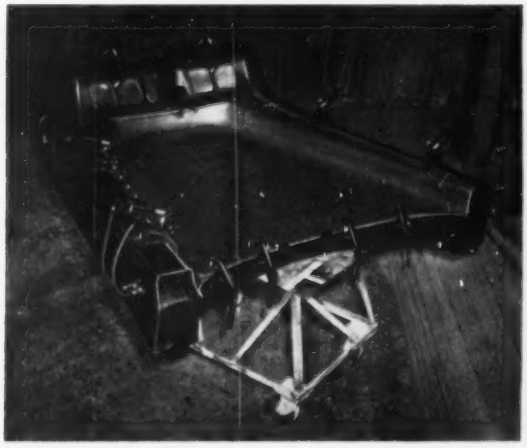


Fig. 9—Fixture with sub-assemblies in position for spot welding

Fig. 10—Applying wax to a mold for a floor mat checking fixture

Fig. 11—Laying-up glass cloth and resin on checking fixture mold

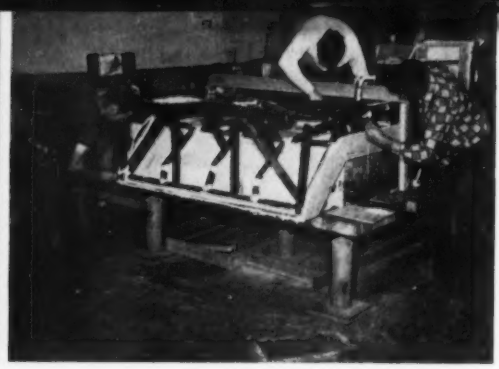


Fig. 12—Base frame for checking fixture is built up of stock parts

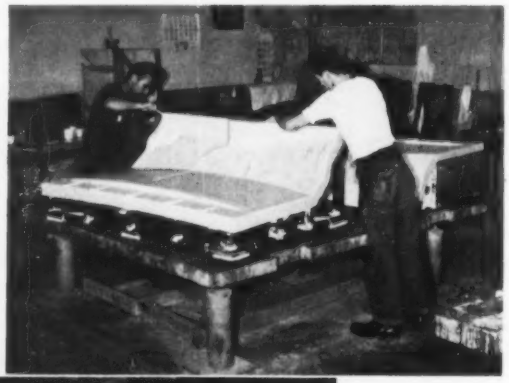


Fig. 13—Cleaning flash from edges of reinforced plastics fixture. It has been turned over from Fig. 12 position

Fig. 14—Checking fixture is given final inspection. Blocks doweled in position check location of holes in floor mat

Fig. 15.—How checking fixture is used. Rubber mats placed on it are checked for contour, outline, and location of holes

9 shows the completed fixture with sheet metal sub-assemblies in position to be spot welded. These several different metal stampings are held accurately in position by the air clamps. The accuracy of this welded assembly depends entirely on the reinforced plastics faces of the fixture and not at all on the cast iron frame. By using such fixtures, uniform hoods and other parts are produced which aid greatly in assembling cars on a mass production basis.

Quality Control Fixture

In addition to welding fixtures, die spotting racks, etc., reinforced plastics fixtures are also used for quality control and inspection. Figure 10 illustrates a completed mold for a floor mat checking fixture, made from a composite of two wood models of the floor pan stampings of a truck. Wax is being applied. In Fig. 11, glass cloth layers are being built up and liquid resin applied.

Figure 12 shows the building of the base frame with Ren-ite stock tubing and fittings. In Fig. 13, mechanics are cleaning off flash. In Fig. 14, the completed fixture is being given final inspection, and in Fig. 15 a rubber mat is placed on it for a check of contour, outline, and hole locations. Note in Fig. 14 how blocks have been dowelled into exact position for the purpose of checking the accurate location of the holes provided in the floor mats for clutch and brake pedals, etc.

These are only a few specific examples of the use of reinforced plastics tooling for the automotive industry. It takes but little imagination to begin to visualize the extent to which these principles can be expanded in other industries in the future.

How to Calculate Expansion of Acrylic Sheet*

A DESIGNER who includes an acrylic plastic component in his product should be aware of the linear expansion characteristics of this material if he expects to frame it wisely. With improper clearance between the edges of an acrylic inspection window and its frame, for example, extremes in operating temperatures may cause buckling of the panel or leaks around its edges. And in design applications where dimensions are critical, it may also be desirable to calculate expansion or contraction of acrylics caused by changes in humidity.

A difference in temperature or humidity on opposite sides of an acrylic panel may cause the panel to become dished or bowed. When acrylic partitions are used to separate liquids and gases of different temperatures and humidities because of the material's insulating qualities, strength, corrosive resistance, and transparency, this differential bowing tendency may cause chamber volume changes in equipment and should be considered in original design.

Graphs presented here give the factors that the design engineer needs in order to determine how an acrylic product component responds to changes of temperature and humidity. These charts were derived from tests conducted on Plexiglas, an acrylic plastic manufactured by Rohm & Haas Co., but the indicated values approximate closely the characteristics of other acrylics.

Thermal Expansion

Coefficients of linear thermal expansion of Plexiglas II are plotted opposite temperatures ranging from −50 to +50° C. in Fig. 1. Acrylic specimens, for the test from which these charts were drawn, were pretest conditioned at 25° C. and 50% relative humidity.

Determination of thermally produced dimensional changes in a panel of Plexiglas can be illustrated by example. Consider a 36 in. panel of Plexiglas II subject to a temperature change from −50 to +40° C. What will be its variation in length?

From Fig. 1: coefficient of thermal expansion for Plexiglas II at −50° C. = 0.000044; coefficient of thermal expansion for Plexiglas II at +40° C. = 0.000081; average coefficient = $\frac{0.000044 + 0.000081}{2} = 0.000062$. Multiplying the average coefficient by the temperature range and the panel length ($0.000062 \times 90 \times 36$), gives 0.201 in. as the expected change in length caused by temperature change.

Water Vapor Expansion

Changes in the water vapor content of Plexiglas result in dimensional changes of this acrylic plastic. As shown in Fig. 2, this expansion amounts to about 0.38% for a change of relative humidity from 0 to 100% when comparison is made at 25° C.

To determine the change in length caused by changes in moisture content, multiply the length of the panel in inches by the difference between the values shown (Fig. 2) for the high and low relative humidity conditions which will be encountered. Example: What is the increase in length of a 12-in. long specimen conditioned at 30% R. H. when permitted to attain equilibrium in 90% R. H. at constant 25° C. temperature? From Fig. 2, we obtain 0.00285 − 0.00050 = 0.00235 in. difference in length per inch of length. For the 12 in. specimen, then, $0.00235 \times 12 = 0.028$ in. change in length.

Design Considerations

When an acrylic sheet is bonded rigidly to a material of different expansion characteristics and the assembly is subjected to temperatures and humidity other than those of the bonding conditions, differential expansion of the two materials will tend to bend the assembly. If the assembly is restrained against bending or if the non-acrylic material has a much higher or lower modulus of elasticity, the difference in coefficients of thermal expansion can develop considerable stress in the Plexiglas. These stresses are independent of the length (or width) of the cemented joint

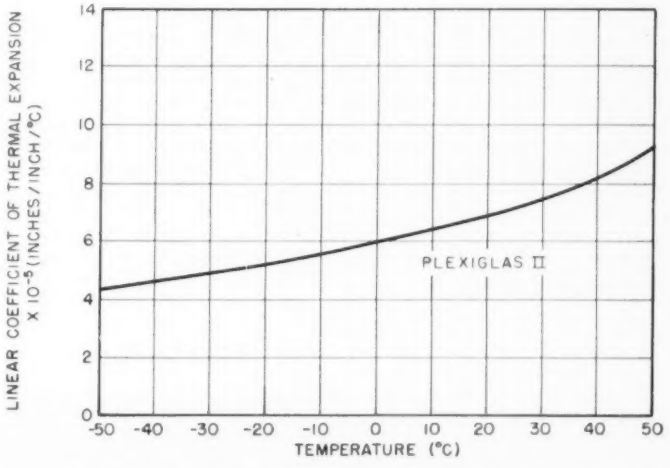


Fig. 1—Curve obtained by plotting linear coefficients of thermal expansion against temperatures is used in the determination of thermally caused dimensional changes

* Prepared by the Staff of Physics Laboratory, Rohm & Haas Co., Philadelphia, Pa.

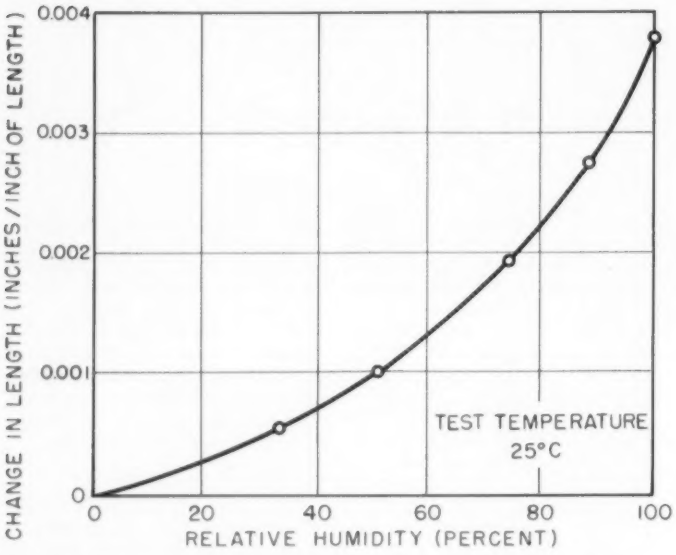


Fig. 2—Curve of change in length with changes in relative humidity is used to determine variation in length of acrylic panels with changes in water vapor content

and may be sufficient to cause crazing or cracking of the Plexiglas, or to break the bond between the two materials. Accordingly, materials to be rigidly cemented to the acrylic part should be selected to have coefficients of expansion as nearly as possible equal to that of Plexiglas to minimize thermally induced stresses.

In applications where a rigid high-strength bond is not required, an elastomeric adhesive or cement can be used between the acrylic plastic and a framing material of different expansion characteristics. The two materials are thus permitted to expand and contract with a minimum of stress in each. The maximum area which can be bonded by this technique is limited by the thickness, elasticity, and strength of the bonding medium which is subject to stretching and compression in shear with temperature changes.

Differential Temperature Bowing

When one side of an acrylic panel is warmer than the opposite side it will expand more and bow out. The crown of the bowed section extends toward the hottest side. From the nomograph in Fig. 3, the height and radius of this crown can be determined.

To determine deflection caused by temperature differentials the following procedure is used.

1) Determine the unit difference in dimensions of the two surfaces of the panel caused by the temperature differential by multiplying the average coefficient of thermal expansion from Fig. 1 by the difference between the temperature (°C.) of the two surfaces.

2) Determine radius of curvature caused by temperature differential by drawing a straight line through value obtained in 1) above on scale (C) and the thickness scale (T). Continue line through scale (R), and read radius of curvature.

3) Determine total amount of bowing in panel by drawing a straight line through radius of curvature on scale (R) and diameter of panel on scale (D). Continue line through scale (H) and read center deflection directly on scale (H).

Surface temperatures are used in this calculation. In the case of an air-Plexiglas-air installation, the actual surface temperatures differ significantly from the surrounding air temperatures and must be measured or calculated. Deflections for unrestrained square or rectangular panels are determined in the same manner as circular panels using the diagonal dimension of the panel as the "diameter."

The following is an example of the use of the chart (Fig. 3) for predicting the extent of bowing in an acrylic panel:

Problem: How much bowing can be expected in an unrestrained 30 in. diameter 0.187-in. thick Plexiglas II panel which has a surface temperature of +25° C. on one side and +40° C. on the other side?

1) Find the average coefficient of thermal expansion for Plexiglas II at the +25° C. and +40° C. intercepts from Fig. 1. The average of these values is $\frac{0.000072 + 0.000082}{2}$ = 0.000077 in./in./°C.

Multiply the average coefficient of thermal expansion (°C.) by the difference in temperature at the two surfaces. (40° C. − 25° C. = 15° C.); 0.000077 × 15 = 0.00115.

2) Using Fig. 3, lay a straight edge between the 0.00115 mark on scale (C) and 0.187 in. thickness on scale (T) intercepting scale (R) at 162. Then lay the straight edge from this point on scale (R) to the 30 in. mark on scale (D) and continue the line through scale (H). The center deflection (bow) from scale (H) is equal to 0.695 inch.

Differential Humidity Bowing

When acrylic panels are subject to different relative humidities on the two surfaces of the sheet, the resulting dimensional changes will cause an unrestrained panel to bow in the direction of the more humid atmosphere. The extent of this bowing in a panel at 25° C. can be determined from the graphs in Figs. 2 and 3.

Steps in procedure to determine the amount of bowing due to humidity differentials at 25° C.:

1) Determine the difference in change in length per unit length at the two humidities from Fig. 2 by subtracting the low humidity intercept from the high humidity intercept on the graph.

2) Determine radius of curvature caused by humidity differential by drawing a straight line through value obtained in 1) above on scale (C) and the thickness on scale (T) of Fig. 3. Continue the line through scale (R). Read radius of curvature on scale (R).

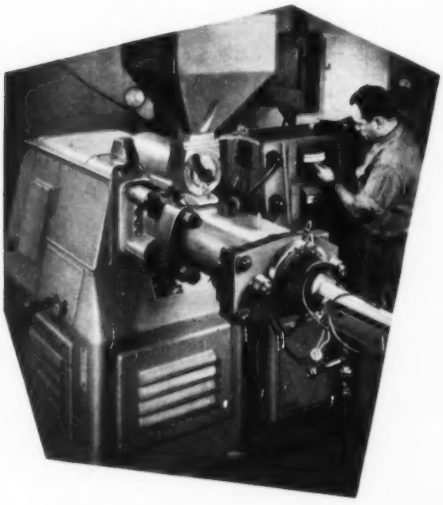
3) Determine total amount of bowing in panel by drawing a straight line through radius of curvature on scale (R) and diameter

Stokes-Windsor Extruders are in successful and profitable use by leading companies

A partial list of these manufacturers is given at right, with a statement of the products they are making.

Stokes-Windsor Extruders have become a "success story" during the last 18 months, and the demand for the products of these unique machines makes the future appear extremely bright. Sheeting, sections, hose, welting, and rigid pipe are some of the products. Rigid and elastomeric PVC, polyethylene, cellulose acetate, butyrate, polystyrene, Kel-F and others, are among the materials. These versatile machines are also finding growing acceptance for compounding, coloring and extruding in a single pass from pre-blended powder formulations.

Get the FACTS on Stokes-Windsor Extruders and their use. Available from our home office or any of our ten branch offices. We shall arrange a demonstration at your convenience.



Stokes-Windsor Extruder is shown producing PVC rigid pipe. Complete take-off equipment can be provided, including water bath, pulling rolls and automatic cut-off saw.

ALPHA PLASTICS West Orange, N. J.
for rigid PVC pipe

AMERICAN AGILE CO. Maple Heights, Ohio
for rigid PVC pipe and sheeting

BOLTA COMPANY Lawrence, Mass.
for rigid PVC pipe and rod extrusion

CARLON PRODUCTS, INC. Cleveland, Ohio
for rigid PVC pipe

CLOPAY CORPORATION Cincinnati, Ohio
for rigid PVC pipe — elastomeric PVC sheeting

COLONIAL PLASTICS Cleveland, Ohio
for rigid PVC pipe

DEWEY & ALMY Cambridge, Massachusetts
for the evaluation of various vinyls and other resins for extrusion

DOW CHEMICAL CO. Midland, Michigan
for rigid PVC; compounding and coloring of polystyrene

FIRESTONE CHEMICAL COMPANY Pottstown, Penna.
for rigid PVC experimentation

FIRESTONE TIRE & RUBBER Akron, Ohio
for small cross-sectional rubber extrusion

GARLOCK PACKING CO. Palmyra, New York
for extrusion of, and development work in, Kel-F, nylon and polyethylene

GUSTIN-BACON Kansas City, Kansas
for development project

JOHN W. HANCOCK, JR., INC. Roanoke, Virginia
for polyethylene pipe and tubing

HEDWIN CORPORATION Baltimore, Maryland
for elastomeric PVC sheeting and rigid PVC extrusion

IDEAL TOY CORPORATION Long Island, N. Y.
for plasticized PVC scrap reclamation; compounding and coloring of PVC and polystyrene

LAWRENCE PROCESS CO. Lawrence, Massachusetts
for elastomeric vinyl sectional extrusion, garden hose, shoe welting

NATIONAL BUREAU OF STANDARDS Washington, D. C.
for development work

RIVERDALE PLASTICS Jersey City, New Jersey
for cellulose acetate and polystyrene scrap — reclamation and compounding and coloring of virgin material

VIPLAX PRODUCTS Beverly, New Jersey
for rigid PVC pipe

YARDLEY PLASTICS Columbus, Ohio
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F. J. STOKES MACHINE COMPANY
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STOKES MAKES: High Vacuum Equipment, Vacuum Pumps and Gages / Industrial Tabletting, Powder Metal and Plastics Molding Presses / Pharmaceutical Equipment

of panel on scale (D). Continue line through scale (H) and read center deflection directly on scale (H).

It must be remembered that whereas dimensional changes resulting from a change in temperature are produced in a relatively short time, the dimensional changes resulting from a change in humidity may require several weeks to come to an equilibrium condition in the Plexiglas.

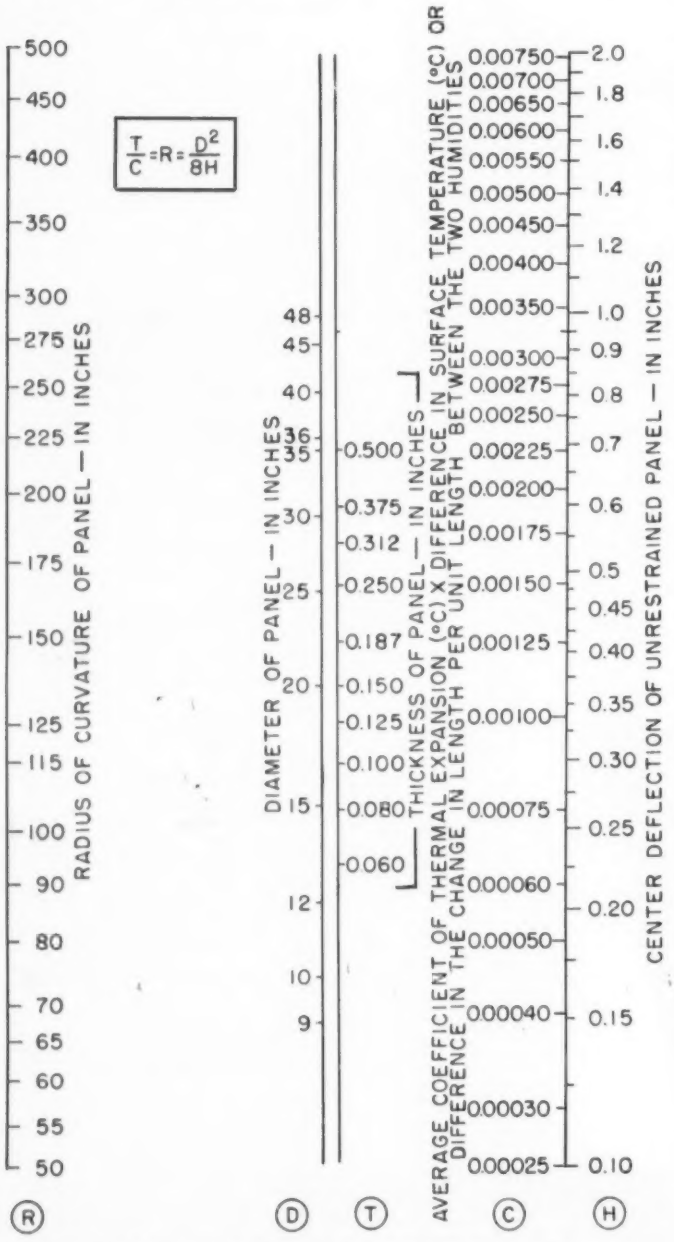


Fig. 3—Nomograph for determining bowing of unrestrained acrylic panels due to temperature and humidity differences across thickness. Data are obtained from Figs. 1 and 2

Problem: How much bowing can be expected in an unrestrained 30 in. diameter 0.187-in. thick Plexiglas panel which is subjected to relative humidities of 25% on one side and 75% on the other side with the panel at 25° C.?

1) Find the difference in the unit length as in 1) above for the 75% and the 25% relative humidity intercepts from Fig. 2. 0.00195 − 0.0004 = 0.00155.

2) Using Fig. 3, lay a straight edge between the 0.00155 mark on scale (C) and 0.187 in. on scale (T) intercepting scale (R) at 121. Then lay the straight edge from this point on scale (R) to the 30 in. mark on scale (D) and continue the line through scale (H). Center deflection from scale (H) = 0.9 inch.

When both differential temperatures and relative humidities are acting on an unrestrained Plexiglas panel, the tendency to bow may be greater or less than when the panel is subjected to either the temperature differential or the relative humidity differential. The approximate[1] amount of bowing expected under such conditions can be determined by the method outlined under either Differential Temperature Bowing or Differential Humidity Bowing except that the unit dimensional change, including both differential temperature and differential humidity effects (value used on scale (C) of Fig. 3), is determined as follows:

If High Temperature and High Relative Humidity are on same side of panel: Add Average Coefficient of Thermal Expansion for Temperature Differential to Difference in Change in Length per Unit Length for the relative humidity differential.

If High Temperature and Low Relative Humidity are on same side of panel: Determine difference between Average Coefficient of Thermal Expansion for temperature differential and Difference in Change in Length per Unit Length for the relative humidity differential.

Unrestrained panels of Plexiglas which have bowed due to humidity or temperature differentials and which have arrived at equilibrium temperature and humidity conditions are not under stress. Any edge restraint will reduce the deformation but will also result in stressing the panel.

[1] Approximate, since the humidity effect has been determined only at 25° C.

Universal Injection Machine

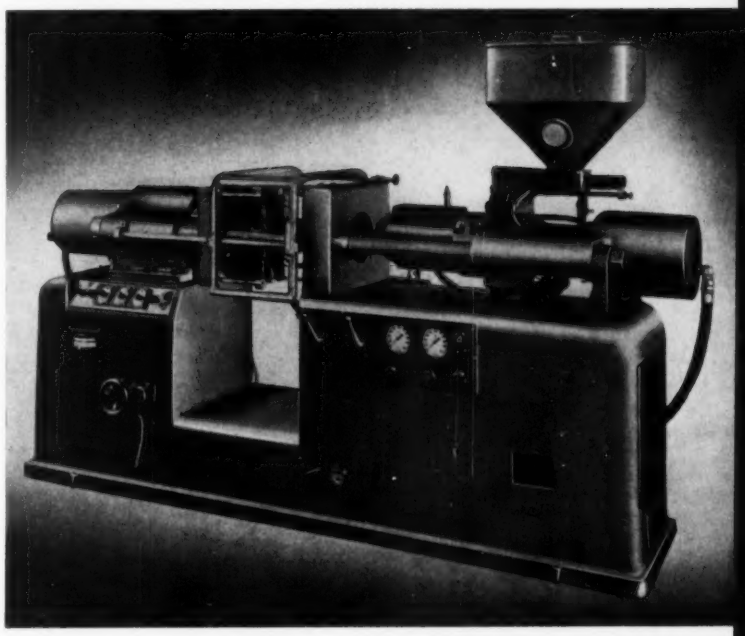
Hydraulically-operated 3 oz. injection molding machine is fully automatic

RECENT addition to the family of injection molding machines being produced by DeMattia Machine & Tool Co., Clifton, N.J., is the 3-oz. Model "K" universal, fully automatic machine. The Model "K" features a straight-line hydraulic clamp with a built-in intensifier that increases 1000 p.s.i. pressure to 5300 p.s.i. on the mold closing ram.

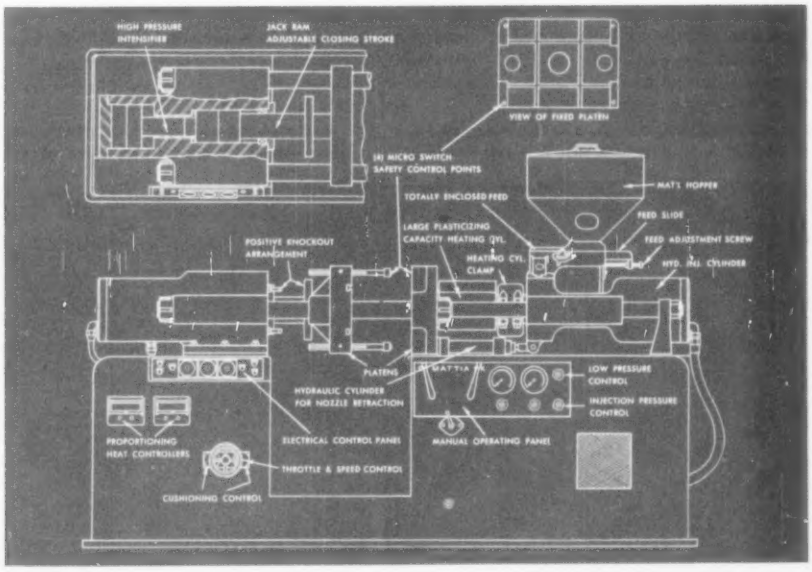
Under 1000 p.s.i. pressure the ram closes at a fast rate until it is within a short, but safe, distance of fully closing. Pressure then automatically drops practically to zero, until contact is fully made with four Microswitches placed on the corners of the die platen. These switches are in series with the intensifier and, when actuated by the ram, cause the intensifier to apply full clamping pressure of 76 tons on the mold faces. This arrangement makes it practically impossible to injure molds should molded pieces stick in the mold.

Hydraulic Pressure

The operation of all movement is fully hydraulic, including the snubbing and stopping of the die closing



Overall view of universal automatic injection machine. Microswitch arrangement on platen prevents damage to molds by controlling application of high pressure to hydraulic clamp



Schematic diagram of injection machine, showing location of automatic features. Top left—high pressure intensifier; top right—fixed platen and Microswitches. Fully enclosed volumetric feeding unit is at right

Rear view of universal injection machine, with all automatic features in position, running a 2-cavity lamp shade mold and automatically depositing molded items in a container

platen. This is accomplished by using pilot valves actuated by cams, thus permitting adjustable closing and opening strokes with proper snubbing at both ends of the strokes.

Hydraulic pressure is supplied by a Vickers unit coupled with specially designed valves which eliminate excessive piping.

Automatic feeding is made possible by means of a starved weight material feeding device. This device, which can be mounted on standard models without alterations or electrical switch interlock, automatically stops feeding material if it builds up excessively ahead of the injection piston due to incorrectly measured feed.

The company has also developed and will supply at additional cost, a number of devices which greatly aid in making automatic molding 100% efficient under every condition.

Optional Features

These include a mechanical finger-type brush-off arrangement to remove pieces stuck on ejector pins, or to eject shot from mold face into a water tank, on to a conveyor, or to a sprue picking device.

The sprue picking device, another of the machine's optional features, acts as a mechanical hand and lays the shot flat on a conveyor belt for removal to a degator or a storage receptacle.

Also available as optional equipment is a water tank for use on jobs where quick cooling is required. The tank is equipped with a brush-on paddle. Shots drop into the water tank for cooling and are then brushed on to the conveyor belt for removal to the next step in the operation.

Heat control is provided by two proportioning heat control units mounted on the machine.

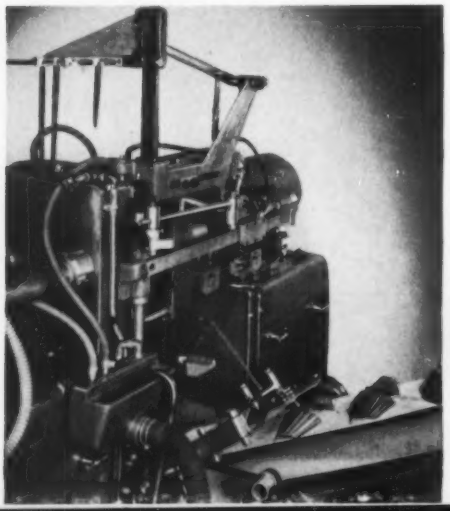
The complete injection assembly can be moved back in seconds to facilitate removal of sprues from the sprue brushing when that should become necessary.

For manual operation, the machine is equipped with mechanical, hydraulic and electrical interlocks for safe operation.

Specifications for New Injection Machine

Oz. molded per shot (styrene)	3
Lb. of plasticized material per hr.	70
Pressure on material	16,250 p.s.i.
Machine cycles per min. (Dry run, full stroke)	8½
Size of max. mold plates	14 in. by 16 in.
Mold opens (stroke)	10 in.
Max. daylight	18 in.
Min. die space	8 in.
Mold closing pressure	76 tons
Size of machine	114 in. by 30 in. by 72 in. high
Total wattage on heating cyl.	8800 watts
Motor size	15 h.p.

Sprue picker transferring shot from mold to conveyor. Mechanical brush-off is in position to eject next shot from mold



Rear view of starved weight feeding device which stops feeding material if it builds up ahead of injection piston

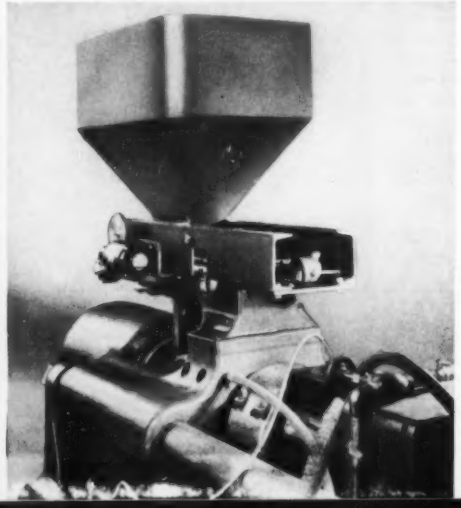


Fig. 1—Over-all view of new injection machine capable of an actual production speed of 1200 shots per hour. It incorporates a combination preplasticizer and injection cylinder

1200 Shots Per Hour

INCORPORATING a new and patented injection cylinder, a 1 to 2 oz. high speed fully automatic injection machine (Fig. 1) has been placed on the market by Dowding & Doll Ltd., London, England. The new type injection cylinder might be called a combination preplasticizer and injection cylinder in one; the injection ram operates on fully plasticized material at all times. The machine has a "dry-run" speed of 1200 cycles per hour; in fact, this speed was obtained in actual production using a single cavity mold for a piece weighing ¼-oz. A ½-oz. styrene shot was run in production at 700 shots per hour; this speed limitation was imposed by the fact that the maximum plasticizing capacity of the machine is 22 lb. per hour.

The injection end of the machine is of unique design. Instead of a male spreader it makes use of what might be called a female spreader in that slots are machined on the interior wall of the injection cylinder as illustrated in Figs. 2 and 3. The injection ram is comparatively long; even when in the fully retracted position (Fig. 4) it is only 2 in. from the delivery or front end.

A metal sleeve, known as a "prefill ring," is assembled on the rear end of the injection ram. The interior wall of the cylinder toward the rear does not have machined slots as the front end does, but instead, is round and smooth, having an I.D. equal to the O.D. of the prefill ring plus some clearance.

This ring, hydraulically operated, rides backward and forward on the

(*Continued on p. 120*)

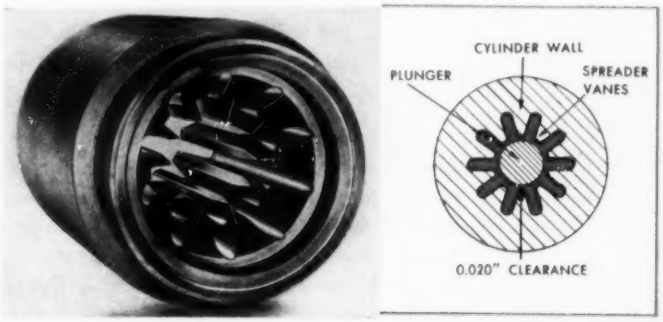


Fig. 2, left—Injection cylinder showing machined slots through which material is forced to front end of cylinder. Fig. 3, right—Spreader vanes are formed by machined slots

Only among the large family of LAMINAC® polyester resins will you find special combinations of such a wide range of properties.

LAMINAC® RESIN NO.	411315	4115	4116	4119	4123	4124	4128	4129	4134	4146	4150	4161	4202
VISCOSITY — LOW		√	√				√		√		√	√	
VISCOSITY — MEDIUM	√			√	√					√			
VISCOSITY — HIGH						√		√					√
GEL — QUICK	√	√		√							√		
GEL — SLOW			√		√	√	√	√	√	√		√	√
CURE AT ROOM TEMPERATURE	√	√	√	√	√	√	√	√	√	√	√	√	
HIGH MODULUS OF ELASTICITY				√			√	√		√			√
SEMI-FLEXIBLE												√	
FLEXIBLE									√				
CASTING PROPERTIES			√						√		√√	√	
GENERAL PURPOSE MOLDING		√			√		√						
HIGH HEAT DISTORTION[1]				√			√	√		√			
CHEMICAL RESISTANCE				√√			√	√					
ELECTRICAL PROPERTIES		√	√								√		
LIGHT STABILITY	√√												
HEAT RESISTANCE[2]				√			√	√		√			√
FIRE RESISTANCE										√√			

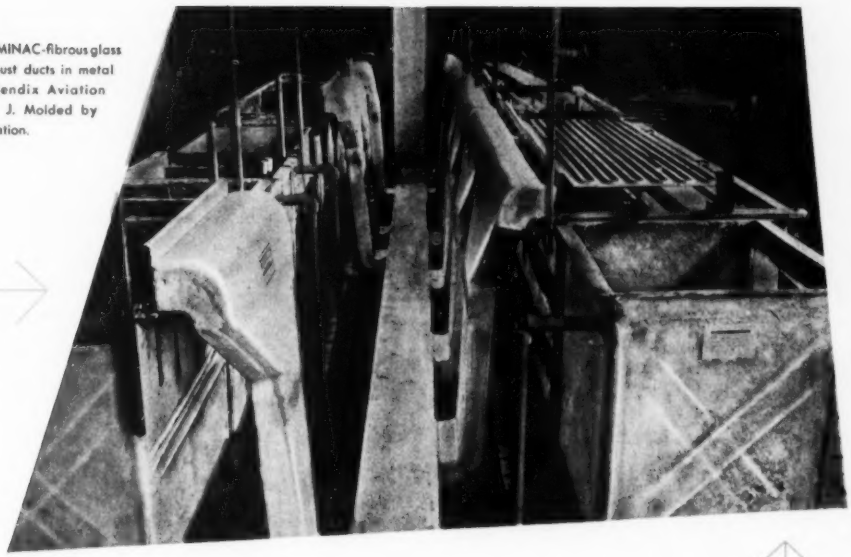
√√ *outstanding*

(1) Range of 200°F to 240°F.

(2) Retention of physical properties after exposure to temperatures of 250°—300°F.

In addition, American Cyanamid now has several newly developed resins for specialized applications. Among these are powdered resin for preform binding, heat resistant formulations for temperatures of 450°F—500°F. and crystalline materials.

Check the wide variety of Laminac Resins available to you for the solution of your product problem. Each of the above resins has been formulated to fill the requirements of a wide range of applications where specific fabricating and end properties are desired. Some are noted for certain outstanding properties as indicated by the double check marks. Probably Cyanamid, with its pioneering skill and experience in the reinforced plastics industry, has the Laminac that will answer your problems—show the way to an improved product or a new product and greater markets.



Corrosion-resistant LAMINAC-fibrous glass tanks and fume exhaust ducts in metal finishing room at Bendix Aviation Corp., Eatontown, N. J. Molded by The Chemical Corporation.

LAMINAC® Resin 4119 Takes Corrosive Baths . . .

. . . cuts installation and maintenance costs in electroplating and metal finishing plants!

Needed: By The Chemical Corporation, Springfield, Mass.—a light, strong, corrosion-resistant material for: electroplating tanks and barrels . . . hoods for tank exhausts . . . ducts and stacks for venting corrosive fumes.

Chosen: LAMINAC polyester resin 4119, reinforced with fibrous glass, for its outstanding chemical resistance, dielectric properties, heat resistance, dimensional stability, high strength-weight ratio, easy molding in large shapes.

Success: The new LAMINAC units resist temperatures up to 250° F, depending upon the solutions involved. And when tested at high voltages employed in electroplating the tanks have proved very satisfactory. No high-cost outside maintenance of tank shells . . . material is the same all the way through, cannot be harmed by spillage or rundown. Units weigh only a fraction as much as heavy, lined steel tanks and, in most cases, need no rigging.

REMEMBER . . . Only in the large family of LAMINAC polyester resins will you find—in superior degree—the combination of curing and service qualities you need. If you have a corrosion problem, we will be glad to help you determine whether there is a LAMINAC resin that meets *all* your requirements.

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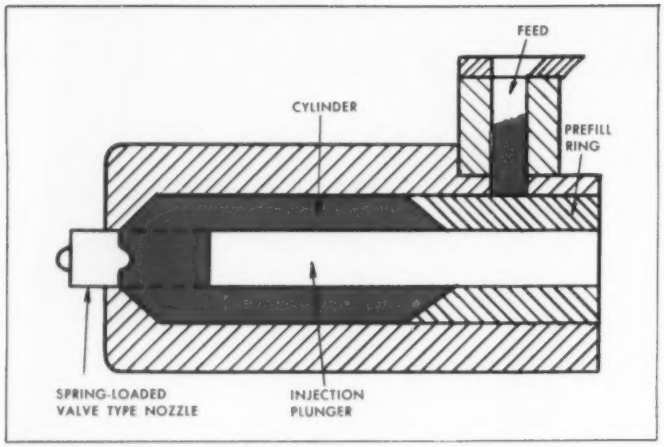


Fig. 4, left—Even when in fully retracted position (with prefill ring in its forward position), the long injection ram is only 2 in. from the front or delivery end of the cylinder

Fig. 5, below—With prefill ring retracted, material from hopper falls into rear end of cylinder. Ring then forces the material forward and material in front end of cylinder forces injection ram backward. Injection takes place with ring locked in forward position

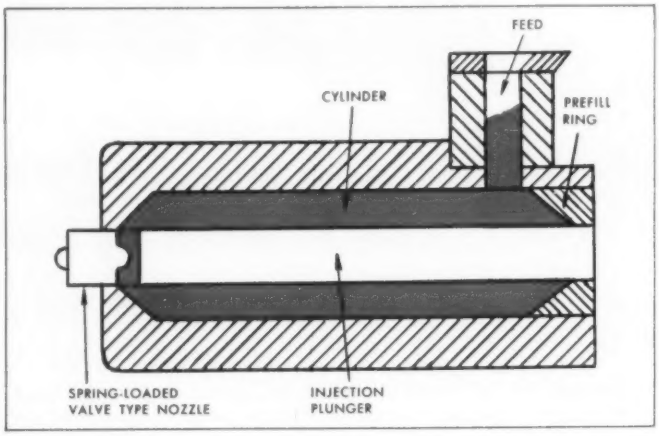
rear section of the injection ram. When the ring is in the retracted position (Fig. 5), the port between the material hopper and the injection cylinder is open and molding material falls into the cylinder. The ring then moves forward. The material ahead of the ring is forced through the spreader slots and thence into the front end of the injection cylinder, forcing the injection ram backward. This is made possible because 1) all pressure is relieved from the ram, permitting it to be moved backward and 2) a spring-loaded valve type nozzle eliminates drooling.

Ring Forces Material

With this setup, all the material ahead of the injection ram is fully plasticized. With the prefill ring locked in its fully forward position, pressure is applied to the injection ram, forcing plasticized material through the nozzle into the closed mold. The prefill ring then returns to clear the feed port so that another charge of material can enter the cylinder.

A hydraulically actuated toggle (Fig. 6) serves to open, close, and clamp the mold, which can have a maximum molding area of 15 sq. inches.

A Microswitch controlling the clamping pressure is not actuated until the mold is within a few thousands of an inch of being fully closed. Thus no damage can be done to the mold if a piece is not ejected or even if a small amount of flash sticks to the mold.



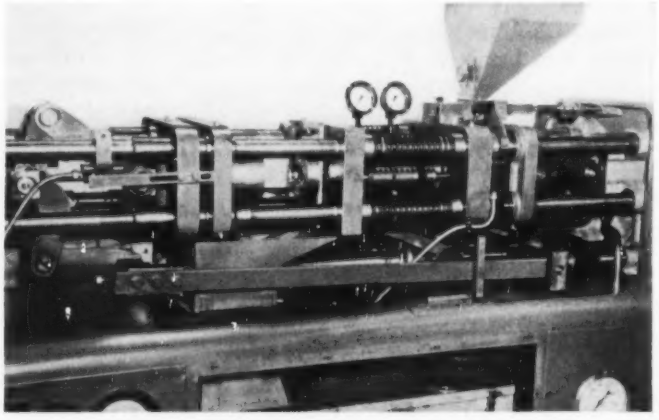


Fig. 6—Hydraulic toggle (at left in illustration above) acts to open, close, and clamp the mold. Clamping pressure is controlled by a Microswitch as a safety precaution

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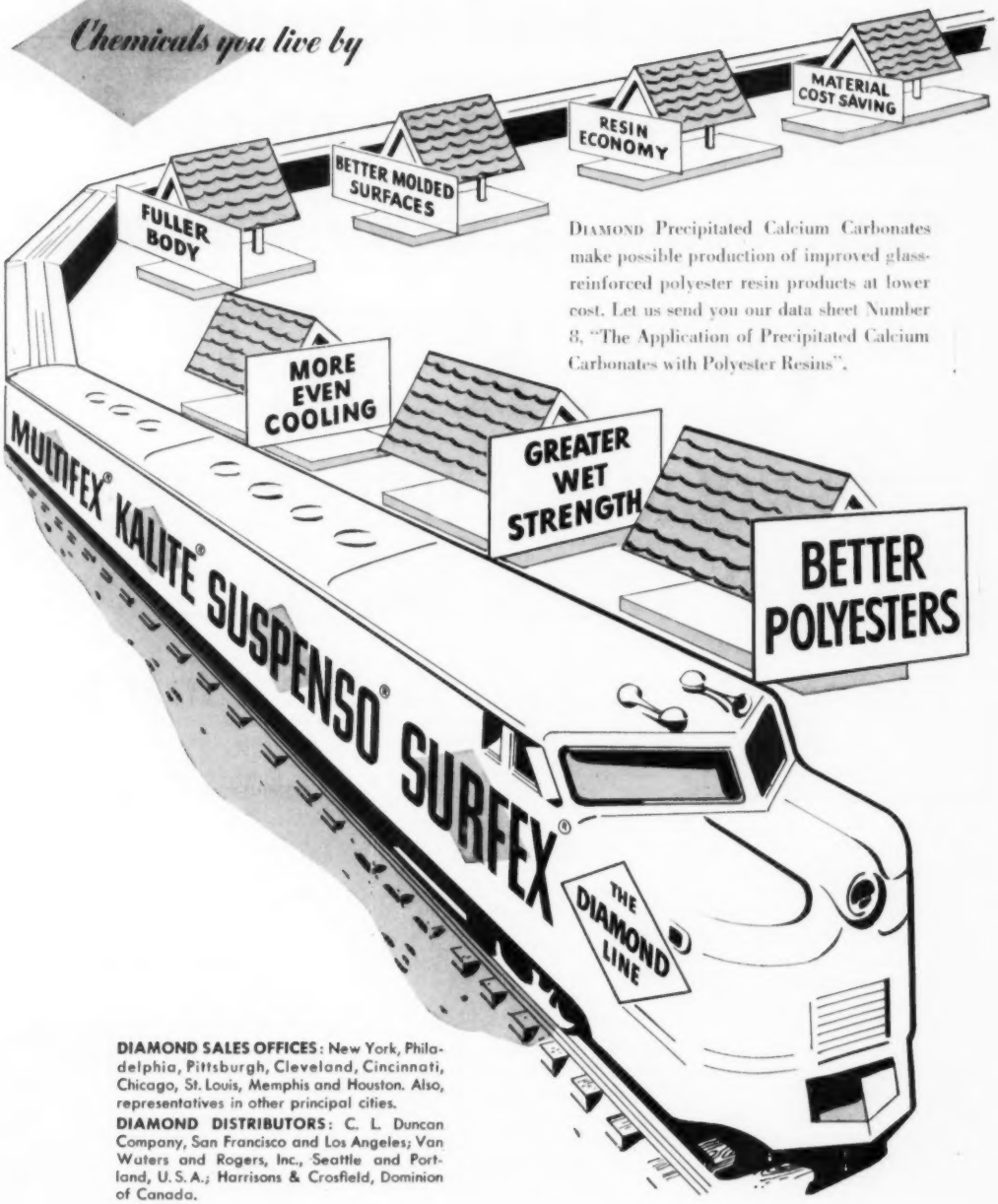

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PLASTICS*
TECHNICAL SECTION: Dr. Gordon M. Kline, Technical Editor

Effect of Heat and Light on Polyvinyl Chloride

by D. Druesedow† and C. F. Gibbs

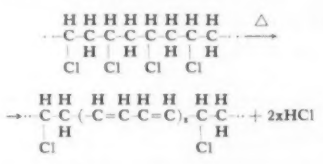
The thermal degradation of polyvinyl chloride is primarily a dehydrochlorination reaction. In an atmosphere of nitrogen the rate tends to approach a steady state and is not effected by a build-up of hydrogen chloride. The intrinsic viscosity of the polymer increases with the state of dehydrochlorination. If oxygen is present, the rate increases with time and the reaction is autocatalytic with respect to hydrogen chloride. A drop in intrinsic viscosity in the early stages of degradation followed by an increase indicates that chain scission and cross linking are competing reactions in the presence of oxygen. Heavy metal stabilizers absorb hydrogen chloride in a nitrogen atmosphere, but when oxygen is present they appear to function through some other mechanism.

Exposure to ultra-violet irradiation at room temperature results in the evolution of small amounts of hydrogen chloride. Measurable quantities of oxygen are taken up during this process. The irradiated polymer is more susceptible to thermal degradation than the original.

Possible mechanisms for these processes are discussed.

THE structure of polyvinyl chloride has been well established as essentially a linear polymer of "head to tail" configuration (1)[1]. Many details, such as branching and terminal groups, remain unexplained. If the structure is linear and all of the chlorine atoms are typically secondary, the thermal stability should be quite high. However, the fact that the best grades of polyvinyl chloride begin to lose hydrogen chloride at temperatures as low as 100° C. indicates that activating influences are present. The character and location of these points of activation have not been demonstrated.

In a given polymer chain, loss of a molecule of hydrogen chloride produces a double bond, the neighboring chlorine atom is converted to an allyl chloride with a high degree of lability. From this point progressive dehydrochlorination takes place at a fairly high rate until a more stable configuration is reached:



The resultant conjugated polyene is colored, the depth of which probably is a function of the total number of conjugated double bonds present (2). Other physical properties such as tensile strength, modulus, hardness, etc. are affected to a much lesser extent.

Degradation by light is similar to thermal breakdown in that hydrogen chloride is lost in the process, although at a very slow rate. Visible light has little effect, the real damage being done by the ultra-violet. In plasticized stocks the predominant effect is stiffening, frequently accompanied by bleeding of the plasticizer. Prolonged exposure results in discoloration similar to that produced by heat.

The use of stabilizers in plasticized polyvinyl chloride stocks is common practice. These are commonly organic metal salts, although epoxides, monoglycerides, and some known ultra-violet absorbers are also used. In Germany, sodium carbonate, sodium phosphate, α-phenyl indole, diphenylthiourea, and urea have been used with some success (3,4). The primary function of these stabilizers is to inhibit the development of color in the stock. The general supposition has been that color stabilization results from inhibition of autocatalysis through removal of liberated hydrogen chloride.

Breakdown Criteria

A number of criteria of breakdown are available for study. These include hydrogen chloride evolution, color development of the polymer, infra-red absorption, mass spectrographic analysis of breakdown products, and molecular weight measurements. This paper reports studies made on hydrogen chloride evolution at carefully controlled temperatures. Particular consideration is given to the effect of oxygen in the atmosphere surrounding the sample. Some attention is given to effect on molecular weight and to plasticized stocks containing stabilizer. Geon 101 polyvinyl chloride was used throughout the investigation.

Thermal Decomposition—The ap-

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* Reg. U. S. Pat. Office.
† The B. F. Goodrich Research Center.
[1] Numbers in parentheses link to references at end of article.

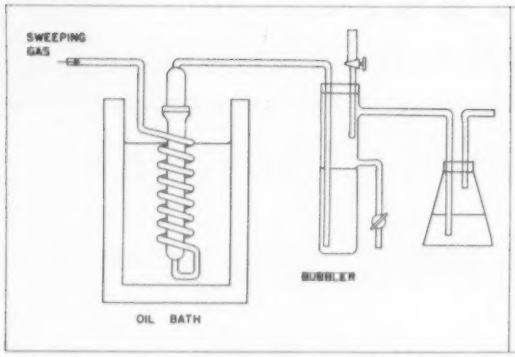


Fig. 1—Apparatus for thermal decomposition of polyvinyl chloride. Specimen is placed in heating tube and then immersed in oil bath

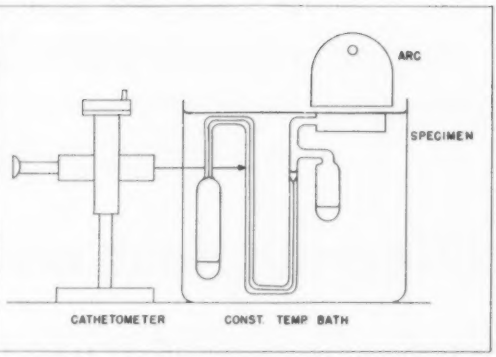


Fig. 2—Apparatus to demonstrate oxygen absorption resulting from ultraviolet irradiation. Mercury arc provides radiation

paratus sketched in Fig. 1 is closely similar to that used in A.S.T.M. D 793-49.

The specimen was placed in the heating tube and immersed in an oil bath held within ±0.5° C. of the desired temperature. Air, oxygen, and nitrogen were used as sweeping gases at 150 cc./min. The hydrogen chloride was collected in water kept alkaline to phenolphthalein by intermittent titration with 0.01N sodium hydroxide. Studies on unplasticized polymer were made on granular, commercial grade polyvinyl chloride.

All the plasticized samples were given identical heat histories during processing, then cut by hand to an approximate dimension of 1-mm. cubes. Specimens containing 1 g. of polymer were used.

Ultra-violet Irradiation—This was a qualitative study only, with specimens exposed for various lengths of time under a Hanovia 500 w. mercury arc. A current of air was passed over the specimen to avoid heating from the lamp. While many plasticized stocks have been studied in this manner, only experiments with unplasticized, granular polyvinyl chloride will be reported in this paper.

Since the effect of oxygen was a suspected factor in ultra-violet action, the apparatus shown in Fig. 2 was used to demonstrate oxygen absorption as a direct result of irradiation. The specimen of polymer was placed in the quartz cell, which was exposed to the direct radiation of a mercury arc. A side tube contained standard sodium hydroxide solution and the manometric system permitted small changes of pressure to be read by means of a cathetometer.

The entire apparatus was then immersed in a water bath with the surface of the quartz cell barely on the surface of the water.

Thermal Decomposition in Nitrogen

An appraisal of the results of thermal decomposition reveals that choice of temperature and the concentration of oxygen in the system has much to do with the rate of dehydrochlorination. This may account for differences of opinion that have existed regarding the nature of the thermal reaction, particularly with respect to autocatalysis. With commercial cylinder grade nitrogen as the sweeping gas and evolved hydrogen chloride plotted against time, a family of curves is obtained, the slopes of which vary with temperature (Fig. 3 and 4). At 150° to 170° C., after an appreciable induction period, the rate of hydrogen chloride evolution increases with time, giving a slight upward curvature to the plot. At higher temperatures, the induction period is less evident; a slight decline of rate prevails after an initial period of acceleration and the curves appear to flatten out at the longer periods of time.

Both length of induction period and the change in rate are probably related to the state of decomposition, as the character of the curvature appears to be the same at all temperatures for the same loss of hydrogen chloride.

The induction period may be likened to the induction periods common to polymerization reactions. These are dependent upon a build-up of active centers. In this case the active centers already exist as points of chlorine lability, but they await a build-up of energy to the critical level before the first molecule of hydrogen chloride is lost. The progressive dehydrochlorination that follows is fairly rapid but soon reaches a point of termination. The controlling factor is the activation energy of a small number of acti-

Fig. 3—Rate of thermal decomposition of polyvinyl chloride in nitrogen. Curves are for temperatures of 150, 160, and 170° C. respectively

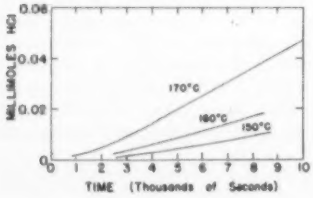
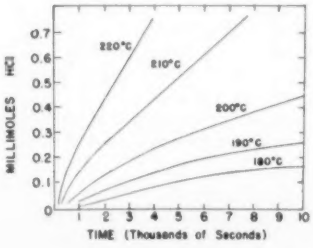


Fig. 4—Thermal decomposition of P.V.C. at higher temperatures than shown in Fig. 3



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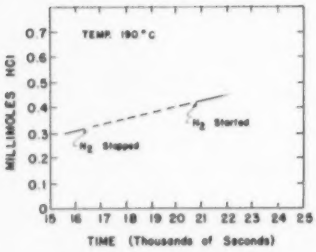


Fig. 5—Effect of HCl on thermal decomposition of P.V.C. in absence of oxygen

vated alkyl chlorides. The character of these points of activation is speculative but the following postulates appear fairly logical:

1) A small amount of branching probably takes place during the polymerization process. These branches are likely on carbon atoms carrying chlorine, thus producing tertiary chloride which could dehydrochlorinate, or hydrolyze and dehydrate, giving rise to allyl chloride units. It is a known fact that small amounts of hydrogen chloride are split out during the polymerization process.
2) Direct oxidation reactions by peroxide catalysts during polymerization would result in a degree of activation of the chlorine atom nearest to the point of oxidation.
3) Catalyst residues may be present that are capable of attacking the polymer chain during the degradation process, thus producing points of increased chlorine activity.

As these active chlorine atoms diminish in number (in the order of their reactivity), the rate falls off and theoretically should reach a steady state. Although this steady state was never reached in our experiments, the rates in nitrogen were observed to fall with time throughout the longest periods of dehydrochlorination.

To determine the effect of hydrogen chloride on the thermal decomposition rate, a run at 190° C. under a nitrogen stream was allowed to go 16,500 sec., then the nitrogen flow was discontinued (Fig. 5). The stagnant system was continued at 190° C. for an additional 5000 sec., whereupon the flow of nitrogen was resumed. The total hydrogen chloride collected was the same as if the flow of nitrogen had not been interrupted. Apparently the thermal reaction in an inert atmosphere is not sensitive to hydrogen chloride concentration.

The effect of the thermal decomposition of polyvinyl chloride in a nitrogen atmosphere on its molecular weight may be inferred from Fig. 6. A pretty good correlation exists between hydrogen chloride loss and intrinsic viscosity. Not indicated by the graph is the fact that at 190° C. polymer insoluble in cyclohexanone appears at 5000 sec. and the sample is largely insoluble at 7000 seconds. At 200° C. the hydrogen chloride loss is 0.06 millimoles per gram at 900 sec., and the molecular weight by intrinsic viscosity is approximately 66,000 as compared with 64,000 for the original polymer. Since the 1-g. specimen contained a potential of 15.6 millimoles of hydrogen chloride, the loss is 0.385%, or at a degree of polymerization of 1024, 3.94 molecules per polymer chain. Computing the cross bonds developed in going from 64,000 to 66,000 molecular weight, one finds 3.12 cross bonds per 100 polymer chains. This gives

$$\frac{3.94 \times 100}{3.12} = 126$$

molecules of hydrogen chloride lost per cross bond. At 2700 sec. and 200° C. one finds, by the same calculation, 38.8 molecules of hydrogen chloride evolved per cross bond. At 5000 sec., the approximate point of insolubilization, 2.7% of the total hydrogen chloride has been lost, or 17.3 molecules per cross bond if all of the polymer chains are assumed to be linked together. The same calculation made for the point of insolubility (7000 sec.) at 190° C. gives 14.2 molecules of hydrogen chloride lost per cross bond.

Several possible mechanisms can

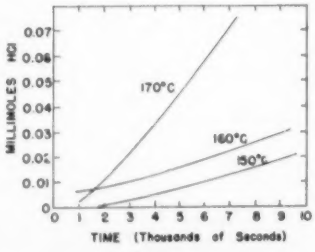


Fig. 7—Rate of thermal decomposition of polyvinyl chloride when swept by air

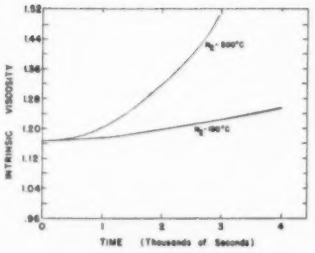
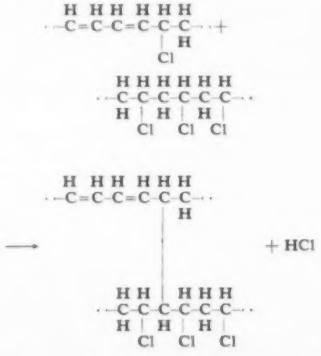


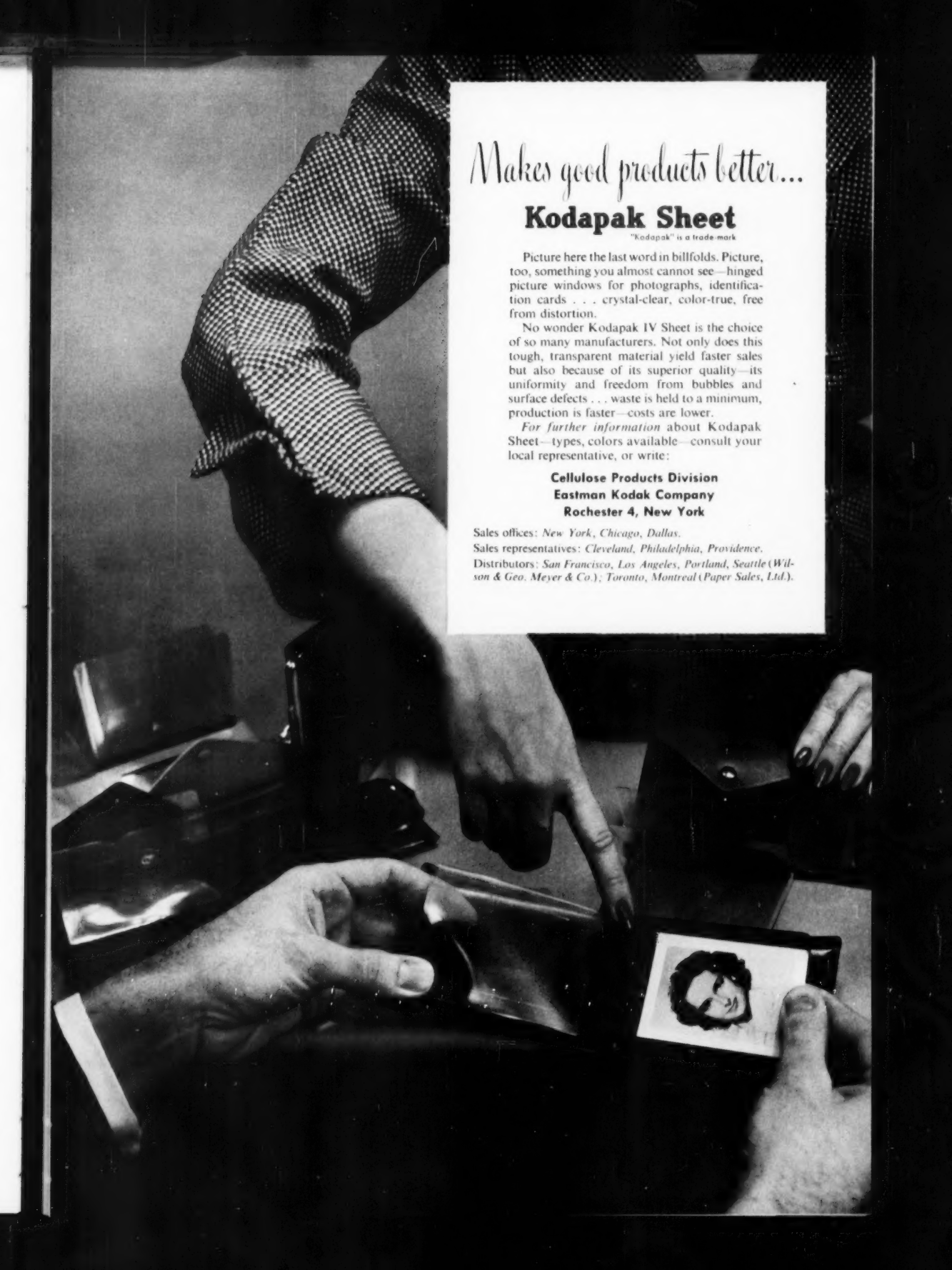
Fig. 6—Effect of decomposition of P.V.C. in nitrogen on molecular weight

be proposed for the cross linking reaction. These include 1) copolymerization between polyene groups, 2) chain transfer between a polyene group and a segment of a normal polymer chain, 3) a Diels-Alder reaction, and 4) cross dehydrochlorination between a point of high chlorine activity on one chain and a hydrogen atom on another. Of these mechanisms, the last seems the most likely when the experimental facts are considered.

Copolymerization between polyene groups seems unlikely due to the small number of such groups present and their isolation from each other. The same may be said for a Diels-Alder reaction. A chain transfer mechanism appears more plausible and may take place to some extent, but initiators normally required for such reactions are absent. Cross dehydrochlorination seems to fill all of the requirements of the situation. It is reasonable to assume that, as progressive dehydrochlorination proceeds, a point will be reached sooner or later at which the most readily available hydrogen atom will be on another polymer chain:



This would stabilize the system and account for the approach to a steady



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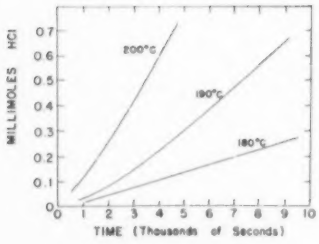


Fig. 8—Thermal decomposition of air-swept P.V.C. at 180, 190, and 200° C.

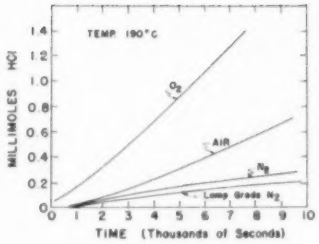


Fig. 9—Rates of thermal decomposition of P.V.C. in air, nitrogen, and oxygen

state condition. Without a block in the dehydrochlorination process, a steadily increasing rate would be observed. This mechanism allows for a maximum number of polyene groups and their preservation as such, which would be in keeping with the progressive development of color in the polymer mass.

Thermal Decomposition in Air

The curves in Fig. 7 and 8 reveal that a different situation exists when air is used as the sweeping gas. The rates of evolution of hydrogen chloride are faster at all temperatures and increase with time regardless of the degree of decomposition. This indicates that atmospheric oxygen is effective in producing new points from which dehydrochlorination is initiated.

The effect of oxygen concentration is shown in Fig. 9. The curve for lamp grade nitrogen (4 parts per million oxygen) represents the reaction for an essentially oxygen-free system. A direct oxygen attack upon the polymer, thereby increasing its susceptibility to dehydrochlorination, is indicated by the fact that the rate is dependent upon concentration.

The autocatalytic influence of hydrogen chloride in the presence of oxygen may be inferred from Fig. 10. A run was made at 190° C., starting with the system filled with air. After 4000 sec. with a stagnant air atmosphere, a flow of nitrogen was started and the total liberated hydrogen chloride titrated. The rate of hydrogen chloride evolution during the period of stagnation was approximately twice that for the air-swept system, using the nitrogen curve as a base. This experiment demonstrates the effect of hydrogen chloride concentration on the dehydrochlorination reaction as well as the fact that catalysis takes place.

Figure 11 presents curves relating intrinsic viscosity to thermal treatment in a current of air. It is evident that chain scission and cross linking are taking place simultaneously. In this case insolubilization occurs at a somewhat earlier point than in the nitrogen system. The relatively large number of molecules of hydrogen chloride lost per cross link in the early stages of the nitrogen reaction would provide ample double bonds for oxygen attack and chain scission. The more rapid hydrogen chloride loss as compared with the decomposition in nitrogen would provide for the faster rate of cross linking, which shortly overtakes the rate of chain scission and leads to early insolubilization. Probably some double bond polymerization takes place also, but the most likely source of cross linkage is cross dehydrochlorination.

In considering possible mechanisms involved in the above experiments, it is evident that in the presence of oxygen a number of reactions can take place, giving rise to a more rapid rate of production of activated chlorine atoms and to cleavage at points of susceptibility in the polymer molecule. That the polyene groups are attacked, as well as other points, is indicated by the fact that at the same hydrogen chloride loss, the polyvinyl chloride specimen was less colored in the system swept by air than in the one swept by nitrogen. Also, it is a well known fact that strong oxidizing agents will decolorize aged polyvinyl chloride, either in the milling process or in solution. Reaction with halogens likewise will decolorize the polymer. The polyene attack may be responsible indirectly for the creation of labile chlorine atoms through the formation of peroxides, which in turn react with a normal chain segment by chain transfer; the active segment is then susceptible to reaction with oxygen, which

(*Continued on page* 216)

Fig. 10—Effect of accumulated hydrogen chloride on the rate of thermal decomposition of polyvinyl chloride in the presence of air

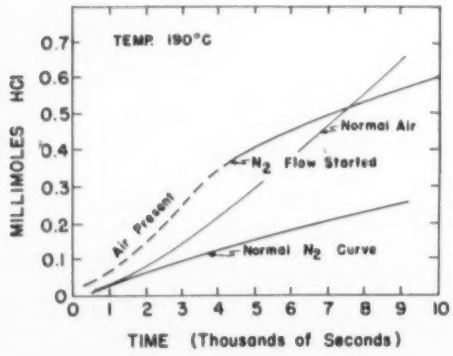
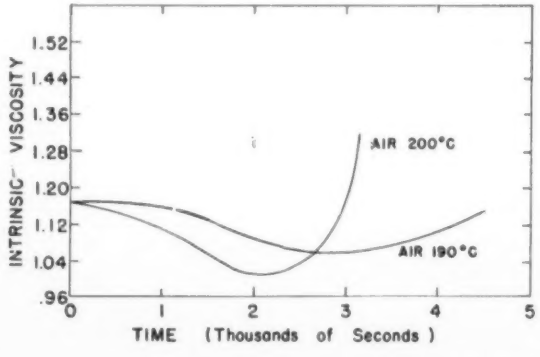


Fig. 11—Effect of thermal decomposition of polyvinyl chloride in air on molecular weight, expressed in terms of intrinsic viscosity



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Stress-Solvent Crazing of Acrylics*

Effect on Tensile Strength of Polymethyl Methacrylate

by B. M. Axilrod† and Martha A. Sherman†

The loss of strength of tensile specimens of polymethyl methacrylate as a result of stress-solvent crazing at 23° C. and 50% relative humidity was investigated. The materials tested were commercial cast polymethyl-methacrylate sheets of both heat-resistant and ordinary grades from each of two manufacturers. Most of the tests were made on samples 0.15 in. thick, covered with masking paper on one side only. The tensile specimens were artificially crazed by applying benzene to the central portion of the reduced section while under stress and were subsequently broken. Specimens for controls were treated identically except that no benzene was applied. Among the factors studied were the sheet-to-sheet variability of crazed and control specimens, effect of masking paper on crazing, and relative effect of a few large crazing cracks compared with more numerous finer cracks.

The masking paper had no consistent effect on the loss of strength resulting from crazing. The principal crazing treatment employed, which produced about two cracks per sq. mm. with a crack length and depth of roughly 1 and 0.15 mm., respectively, caused a loss of strength of approximately 30% in all materials. It was not found possible to predict the tensile strength of a crazed specimen from its appearance. Accordingly, it is suggested that aircraft enclosures with crazing of the type described in this work should be removed if, in service, tensile stress occurs normal to the crazing cracks.

THE loss of strength of polymethyl methacrylate as a result of crazing is a property of considerable importance to the aircraft industry. Information on this subject, however, is quite meager.[1,2] Flexural fatigue tests on specimens taken from partially crazed DC-6 airplane windows indicated that crazing perpendicular to the flexure stress reduces the flexural fatigue strength of the material and may reduce the flexural strength approximately 35%, and that crazing oriented other than perpendicular to flexure stress has very little influence on the flexural fatigue strength of the material.[2] It was recommended that "crazed DC-6 windows should not be used under conditions that produce outward pressure deflection of the outer panel."

The experiments that are described in this report were made to gain more information on the subject of loss of strength as a result of crazing. The experiments were made on tensile specimens that were artificially crazed and then tested for strength. The factors examined included samples from different sources, effect of masking paper, sheet-to-sheet variability, and type of crazing.

The materials were commercial cast polymethyl-methacrylate sheets of both heat-resistant and ordinary grades and were approximately 0.12 to 0.15 in. in thickness. These samples consisted of sheets masked on both sides with the usual adhesive-coated masking paper and sheets masked on one side only, as is done for sheets used to make laminated acrylic glazing. The latter samples, masked on one side only, consisted of one sheet from each of three production runs and are subsequently referred to as the "representative samples." A description of the samples is given in Table I.

Exploratory Tests

Standard tensile specimens (Federal Specification L-P-406a, Method 1011, Type I) were machined from sheets of samples L1a, L2a, P1, and P2 (Table I). A specimen was stress-solvent crazed by stroking the central ¼- by 2-in. portion of one face of the specimen with a No. 1 camel's hair brush, wet with benzene; this was done with a constant tensile load of 2500 or 3000 p.s.i., maintained for 5 minutes. Solvent was not applied to the full width of the specimen as enhanced crazing would result at the edges because of penetration from two sides and residual stresses caused by machining. As the degree of crazing depended on the amount of benzene applied, it was attempted to apply the same amount of benzene to all specimens. This was done as follows: The brush was as wet as possible without dripping and the strokes were repeated at

Table I—Description of Polymethyl-Methacrylate Samples

Material	*Sample designation*	*Nominal thickness (in.)*	*Batches in sample*	*Sheet in sample*	*Sheet size (in.)*	*Masking paper*
Lucite HC201	L1a	0.125	1	1	36 by 48	Both faces
Lucite HC202	L2a	0.125	1	1	36 by 48	Both faces
Lucite HC201	L1d	0.150	3	3	36 by 48	One face only*
Lucite HC202	L2d	0.150	3	3	36 by 48	One face only*
Plexiglas I-A	P1	0.150	---	10	12 by 12	Both faces
Plexiglas II	P2	0.150	---	10	12 by 12	Both faces
Plexiglas I-A	P1a	0.150	3	3	36 by 48	One face only*
Plexiglas II	P2a	0.150	3	3	36 by 48	One face only*

* Sample treated the same as material for acrylic-polyvinyl butyral laminate.

* Condensation of NACA Technical Note 2444.
† National Bureau of Standards.
[1] Bonza, L. F., Tests of Model 49 Cabin Windows. Rep. No. 6174, Lockheed Aircraft Corp., May 26, 1947.
[2] Gouza, J. J., Fatigue Strength and Physical Properties of Crazed Douglas DC-6 Windows. Phys. Lab. Rep. No. 336, Rohm & Haas Co., April 5, 1949.

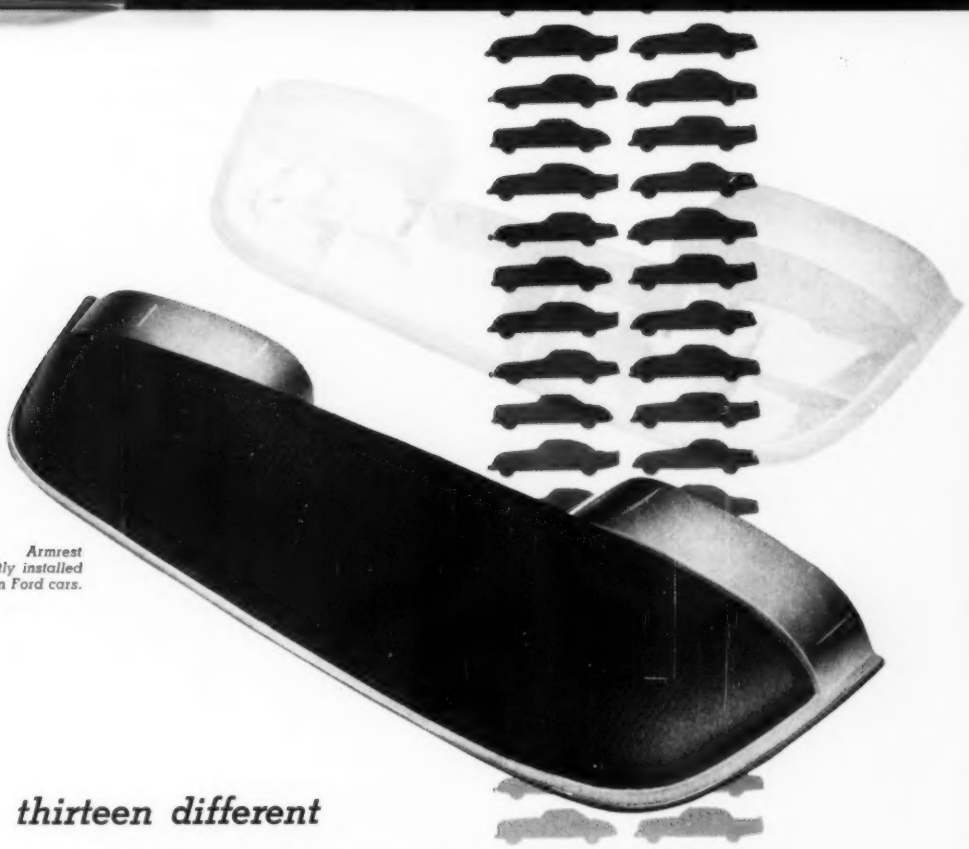

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Table II—Loss of Tensile Strength of Stress-Solvent-Crazed Samples of Polymethyl Methacrylate[a]

			Crazed specimens[c]					*Uncrazed specimens*[d]		
			Conditions for crazing[e]			*Tensile strength*			*Tensile strength*	
Material	*Sample designation*	*Dates tested*[b]	*Brush strokes*	*Stress*[f] *(p.s.i.)*	*Specimens tested*	*Average (p.s.i.)*	*Range (p.s.i.)*	*Specimens tested*	*Average (p.s.i.)*	*Range (p.s.i.)*
Lucite HC201	L1a	6/23	10	2500	6	4600	4000-6200	6	6900	6800-7100
Lucite HC202	L2a	6/8, 7/13	10	2500	8	4800	4100-5600	9	9300	9200-9500
Plexiglas I-A	P1	6/4, 6/7, 6/22	5	2500	11	5100	3800-6200	11	7500	7300-7600
Plexiglas II	P2	6/17, 6/22, 6/23	10	3000	8	6000	4400-8300	9	9200	8800-9400

[a] Tests were made on standard tensile specimens, Federal Specification L-P-406a, Method 1011, Type I. Relative rate of head motion was 0.05 in./min. Specimens of Lucite and Plexiglas were 0.12 and 0.15 in. thick, respectively.
[b] All specimens tested in 1949; on each date, group of crazed specimens and group of controls from same sheet were tested.
[c] After stress-solvent crazing, specimens were conditioned 24 hr. at 25°C. and 50% relative humidity and then tested in conditioning atmosphere.
[d] Specimens subjected to same loading cycle and conditioning treatment as crazed specimens.
[e] A No. 1 camel's hair brush was dipped in benzene. Central ¼- by 2-in. portion of one face of specimen was stroked with brush which was as wet as possible without dripping. Strokes were repeated at 3- to 5-sec. intervals and brush was wet before each stroke.
[f] Load applied for 5 minutes.

3- to 5-sec. intervals, with the brush wet before each stroke.

Control specimens were subjected to the same loading conditions. All specimens were conditioned 24 hr. at 25° C. and 50% relative humidity and were tested in the conditioning atmosphere. Prior to testing the crazed specimens, measurements of the average crack length and depth and of the crack density were made in order to specify the degree and character of the crazing. In addition, photographs were made of some sets of specimens. The average crack length and depth were obtained in the following manner: A 20-power Brinell microscope was used to measure the crack lengths and the crack depths. On each specimen the lengths of some selected cracks were measured and the average value noted. To measure the crack depth, the specimen was viewed against a uniform white background and at an angle of about 45° to the lengthwise direction. The crazing cracks, which appeared as shaded areas, were assumed to be normal to the surface of the specimen. The crack depth was then calculated from the apparent depth, taking account of the foreshortening resulting from the higher refractive index of the polymethyl methacrylate. The cracks in a small selected area were measured and the average depth value noted. The average values obtained on the specimens ranged from about 0.5 to 1.5 mm. for the length and from 0.1 to 0.2 mm. for the depth. The crack density, estimated on each specimen from a count in a selected area, ranged from about 10 to 220 cracks per square centimeter.

Tests Results

The results of the tensile tests are given in Table II. The effect of the crazing is to reduce the tensile strength about 30 to 50 percent. Although it was attempted to craze the specimens in a controlled manner, the crazed specimens for a given sample were much more variable than the controls. The coefficient of variation of tensile strength was 7 to 30% for the various sets of crazed specimens compared with 1 to 2% for this quantity for the controls. Some of the variability in the crazed specimens was associated with crazing different groups on different days, although in the case of sample P2 the highest and lowest strengths were observed in a group of three specimens from one sheet crazed on the same day.

A correlation between severity of crazing and loss of strength was sought as follows: The tensile strengths of the individual specimens of a set were ranked and density of cracks, average crack length, and average crack depth for each specimen tabulated. By inspection of the data it was found that none of these quantities correlated closely with tensile strength. Next, from photographs of each set of crazed specimens, the tensile strength ranking to be expected on the basis of the degree of crazing was estimated and the estimates compared with the actual results. In most cases the tensile strength ranking could not be judged from the photograph.

In an attempt to obtain uniformly crazed specimens, a few experiments were made on tensile specimens that had been exposed without stress to benzene vapor for varying periods. In the first test, after exposure for 16 hr. the specimen was heavily crazed and the edges swollen. Subsequently, specimens whose edges were protected with metal foil adhered with silicone grease were exposed for periods of 4 to 7 hours. It was found that the silicone grease did not protect the edges adequately; when these specimens were subjected to loads of about 3000 to 5000 p.s.i. no crazing occurred except at the edges.

Tests of Representative Samples

Tapered tensile specimens of the representative samples were stress-solvent crazed with benzene applied with a fine brush. From these specimens it appeared that slight and approximately equivalent crazing would occur at stresses of 2000, 2400, 3000, and 3000 p.s.i. for Lucite HC201, Flexiglas Type I-A, Lucite HC202, and Plexiglas II, respectively. These stresses were used in preparing stress - solvent - crazed standard tensile specimens of these samples; the crazing was produced by applying benzene with a No. 1 camel's hair brush to the ¼- by 2-in. central portion of the previously masked face of the specimen. A

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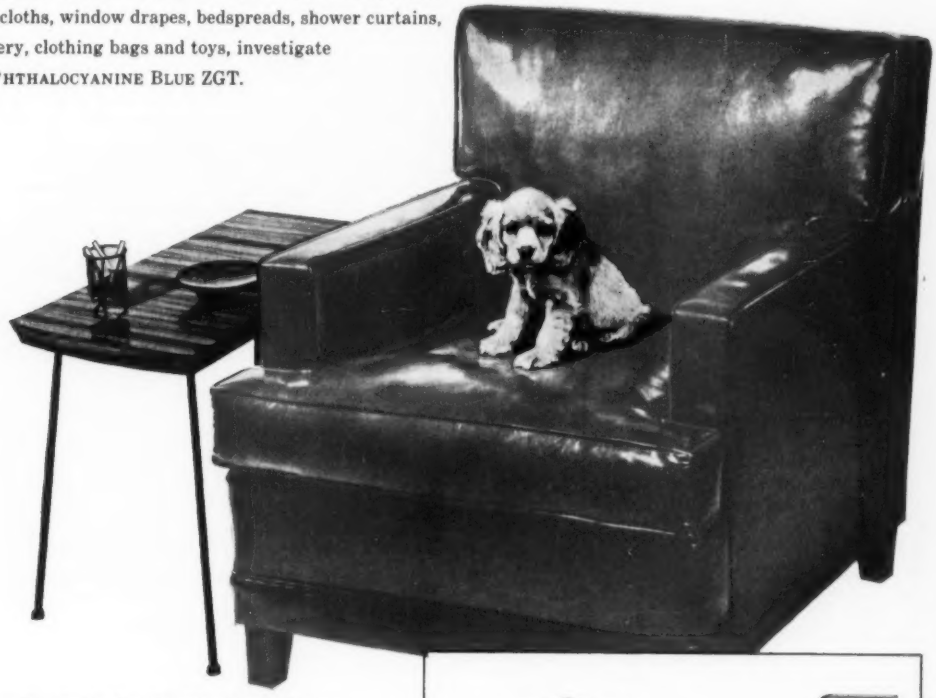

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controlled amount of benzene, 0.03 to 0.04 g. was put on the brush from a marked glass dropper. The specimen was then stroked with the brush until the latter was dry. The specimens were broken one day after being crazed; a testing speed of 0.25 in./min. was used. Control specimens were subjected to the same loading conditions. One specimen from each half of each sheet was tested and the load at which stress crazing began was noted.

A second series of tests was made with the representative samples. Observation of the threshold of stress crazing in the control specimens had been found to be difficult in testing at a relative rate of head motion of 0.25 in./minute. Accordingly a speed of 0.05 in./min. for both crazed and control specimens was used in these tests. The variables included in addition to those previously studied were 1) crazing on the masked face versus crazing on the unmasked face and 2) coarse versus fine crazing.

In studying variable 1), it was believed initially that the crazing treatment was sufficiently uniform so that day-to-day variations would be unimportant and experiments on masked and unmasked sets of specimens were made on different days. As the experiments progressed it was found necessary to make a comparison of the masked and unmasked surfaces of the acrylic sheet on the same day. Accordingly, a test was made in which adjacent specimens from a given sheet of material were solvent-crazed in succession, one on the unmasked, the other on the initially masked face.

With regard to variable 2), the purpose of these experiments was to see whether a few large crazing cracks would cause greater loss in strength than a large number of fine cracks. The coarse crazing was produced by applying a larger amount of benzene and a smaller stress than was used to create the fine crazing. As before, a complete set of specimens for crazing in a given manner and on a given face included one specimen from each half of each sheet. Two control sets of specimens, preloaded, respectively, at the two stresses used for crazing, were tested.

All of these tests on the representative samples were made after the specimens had been conditioned at least 3 weeks at 23° C. and 50% relative humidity. The masking paper was removed at least 7 days prior to the test.

Evaluation of Effects

The results of the tensile tests on the crazed and uncrazed specimens of the representative samples are shown in Tables III and IV.* The appearance of one set of the crazed specimens prior to testing is shown in Figs. 1 and 2.* The coefficient of variation is not reported for each strength value in Tables III and IV because such statistics, based on only six observations, are subject to wide variability. The precision of the data and other statistical points are discussed in detail in the following paragraphs.

The statistical analysis showed that for the tests (Table IV, Groups I and II) in which the relative effects on tensile strength of a few coarse cracks and many finer cracks were compared, no significant difference in strength resulted. Figure 1 shows the appearance of specimens of sample L2d crazed on the masked face by the two Treatments. In this experiment the two Treatments happened to be selected so that they produced essentially the same loss in strength. If the stress or amount of benzene had been different in either Treatment, a different result probably would have occurred; for example, if still finer cracks had been produced by Treatment II, the loss in strength probably would have been decreased.

The effect of the masking paper on the loss of strength of stress-solvent-crazed specimens was demonstrated best by the tests (Table IV, Group III) in which adjacent specimens were crazed in succession, one on the unmasked, the other on the initially masked face. The statistical analysis indicated no consistent effect of the masking paper on the strength of the crazed specimens. One set of specimens for this experiment is shown in Fig. 2. For sample L1d, it appears that the crazing treatment caused fewer cracks on the masked than on the unmasked side; however, for each half sheet, the strength of the specimen crazed on the masked side was on the average the same as that for the unmasked specimen. Similarly, on one or two sheets of other samples the crazing treatment caused fewer cracks on the masked than on the unmasked faces.

An examination of the tensile strength values on the photographs indicates that the tensile strength is not easily predicted from the appearance of the crazed specimen. This is in agreement with the observation made in the exploratory tests. This unpredictability and the greater variability in strength of the crazed specimens are perhaps related and may be explained as follows: The strength of a specimen of a material is a flaw-dependent property. Hence, the creation of a large number of relatively large flaws in the specimen by crazing

* Table IV appears on p. 136, Figs. 1 and 2 appear on p. 138.

Table III—Tensile Strength of Stress-Solvent-Crazed Representative Samples of Polymethyl Methacrylate Tested at 0.25 in./min.[a]

Material	*Sample designation*	*Stress used for crazing[d] (p.s.i.)*	*Tensile strength of crazed specimens[b]*		*Average tensile strength of uncrazed control specimens[c] (p.s.i.)*
			Average (p.s.i.)	*Percent of control average*	
Lucite HC201	L1d	2000	7900	92	8600
Lucite HC202	L2d	3000	8300	77	10,800
Plexiglas I-A	P1a	2400	6800	76	8900
Plexiglas II	P2a	3000	10,200	94	10,900

[a] Six specimens were tested, one from each half of three sheets representing three production runs. Tests were made on standard tensile specimens, Federal Specification L-P-406a, Method 1011, Type I. Specimens were conditioned at least 3 wk. at 23° C. and 50% relative humidity. Masking paper was removed at least 7 days prior to test. Specimens were tested 1 day after they were solvent-crazed.
[b] Benzene in amount of 0.03 to 0.04 g. was put on No. 1 camel's hair brush (about 0.1-in. diam., 0.5-in. length). Then central ¼- by 2-in. portion of specimen was stroked repeatedly with brush. Benzene was applied to surface that had been masked.
[c] Subjected to loading conditions used to cause stress-solvent crazing.
[d] Maintained 5 minutes.
[e] Five specimens only.

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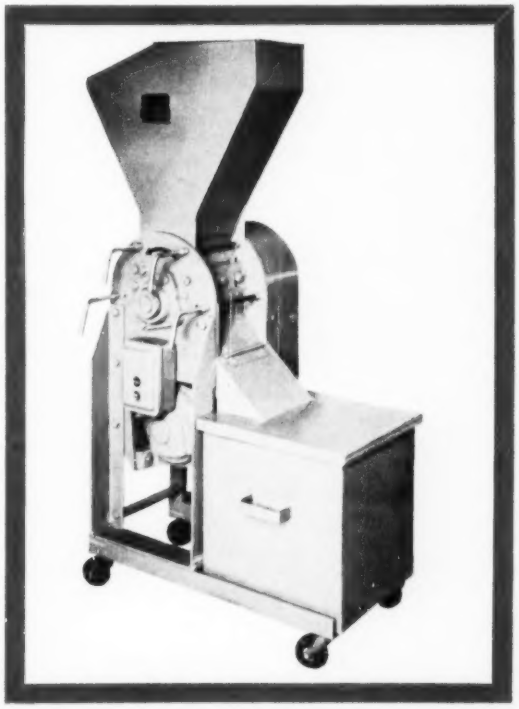

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might be expected to result in a loss in strength of a widely varying amount.

The loss in strength (Table IV) produced by Treatment I and II was roughly 30% for all materials. It should be noted that to produce this loss in strength, a higher stress was used in crazing the heat-resistant-grade as compared with the ordinary-grade material. This is in agreement with the well-known fact that the threshold stress for solvent crazing is higher for the heat-resistant than for the ordinary-grade cast material.

Since it was not found possible to predict the tensile strength of a crazed specimen from its appearance, it seems that an acrylic aircraft enclosure that has crazing similar to that produced in the experiments described herein should be replaced if, in service, tensile stresses normal to the crazing cracks exist.

Statistical Analysis

Control Specimens—As a preliminary to analyzing the data on the solvent-crazed specimens, the data on the control specimens in Tables III and IV were examined for the effect of factors such as testing speed, stress used for crazing, sheet-to-sheet variability, and so forth. A comparison of the data for control specimens in Group I, Table IV, with similar data in Table III showed the following: 1) For all materials the tensile strength obtained at 0.25 in./min. is significantly higher than that obtained at 0.05 in./minute. 2) For all materials there is a significant variation in tensile strength between sheets.

The effect on tensile strength of using different stresses for crazing in Treatments I and II (Table IV) was examined for the control specimens and found not significant. The analysis of these data also indicated a significant sheet-to-sheet variability in tensile strength.

The coefficient of variation, C_v, of the tensile strength of specimens from the three sheets of each material was calculated from the data for 0.05-in./min. testing speed. As there was not enough evidence from these values for the four materials being different from each other, the results were combined. A value of about 5% for C_v was obtained. If the effect of variability between sheets is removed, an average value for C_v of 1.2% results.

The coefficient of variation in

Table IV—Tensile Strength of Stress-Solvent-Crazed Specimens of Representative Samples of Polymethyl Methacrylate Tested at 0.05 in./min.[a]

Material	*Sample designation*	*Stress used for crazing[b] (p.s.i.)*	*Tensile strength of crazed specimens* — *Masked surface crazed* *Average (p.s.i.)*	*Masked surface crazed* *Percent of control average*	*Unmasked surface crazed* *Average (p.s.i.)*	*Unmasked surface crazed* *Percent of control average*	*Average tensile strength of uncrazed control specimens[b,c] (p.s.i.)*
Group I—Treatment I: Stress as indicated; crazed by method B[d]							
			Crazed 1/30/50; tested 2/1/50		Crazed 2/8/50; tested 2/10/50		Loaded 2/15/50; tested 2/17/50
Lucite HC201	L1d	2000	5500	69	4400	55	8000
Lucite HC202	L2d	3000	7100	73	5000	52	9700
Plexiglas I-A	P1a	2400	5000	62	4600	57	8100
Plexiglas II	P2a	3000	8400	84	[e]6300	63	10,000
Group II—Treatment II: Stress as indicated; crazed by method A[f]							
			Crazed 1/18/50; tested 1/20/50		Crazed 2/7/50; tested 2/9/50		Loaded 1/23/50; tested 1/25/50
Lucite HC201	L1d	3000	[e]7800	99	4400	56	7900
Lucite HC202	L2d	4000	7600	78	5300	55	9700
Plexiglas I-A	P1a	3200	6200	76	4700	58	8100
Plexiglas II	P2a	4000	9300	90	8000	78	10,300
Group III—Treatment II: Stress as indicated; crazed by method A[f]							
			Crazed 4/12/50; tested 4/14/50				
Lucite HC201	L1d	3000	6300	80	6500	82	
Lucite HC202	L2d	4000	7500	77	7000	72	
			Crazed 4/18/50; tested 4/20/50				
Plexiglas I-A	P1a	3200	5500	68	5100	63	
Plexiglas II	P2a	4000	7300	71	6600	64	

[a] Six specimens were tested, one from each half of three sheets representing three production runs. Tests were made on standard tensile specimens, Federal Specification L-P-406a, Method 1011, Type I. Specimens were conditioned at least 5 wk. at 23°C. and 50% relative humidity. Masking paper was removed at least 7 days prior to test. Specimens were tested 2 days after they were solvent-crazed.
[b] Stress was maintained for 5 min. after benzene was applied. Control specimens were also subjected to this stress for 5 minutes.
[c] Control specimens were tested 2 days after they were loaded.
[d] Method B: No. 1 camel's hair brush was dipped in benzene and wiped against side of container so as not to drip. Then central ¼- by 2-in. portion of specimen was stroked twice with brush. This process was repeated nine times.
[e] Four specimens only.
[f] Method A: Benzene in amount of 0.03 to 0.04 g. was put on No. 1 camel's hair brush (about 0.1-in. diam., 0.5-in. length). Then central ¼- by 2-in. portion of specimen was stroked repeatedly with brush.
[g] Five specimens only.

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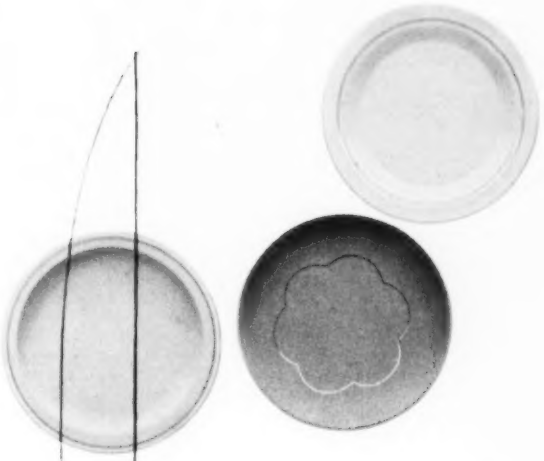

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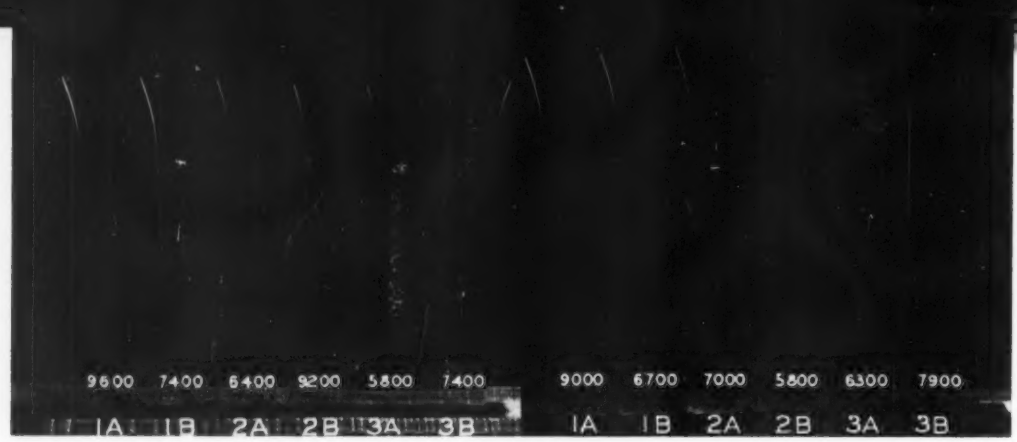


Fig. 1—Tensile specimens of Lucite HC202, Sample L2d, crazed on masked surface. Left, specimens crazed by Treatment II, Table IV; and right, specimens crazed by Treatment I, Table IV. The tensile strength in p.s.i. is shown below each specimen. The designations 1A, 1B, etc. indicate the half-sheet from which the various specimens were taken. Loss of strength is essentially the same for both Treatments

percent was obtained from the equation:

$$C_v = \frac{s}{\bar{x}} 100$$

In this equation, s is the standard deviation:

$$s = \sqrt{\frac{\sum_i (x_i - \bar{x})^2}{N - 1}}$$

where N is the number of measurements, x_i the i^{th} measurement, and $\bar{x}$ the arithmetic mean of x_i's.

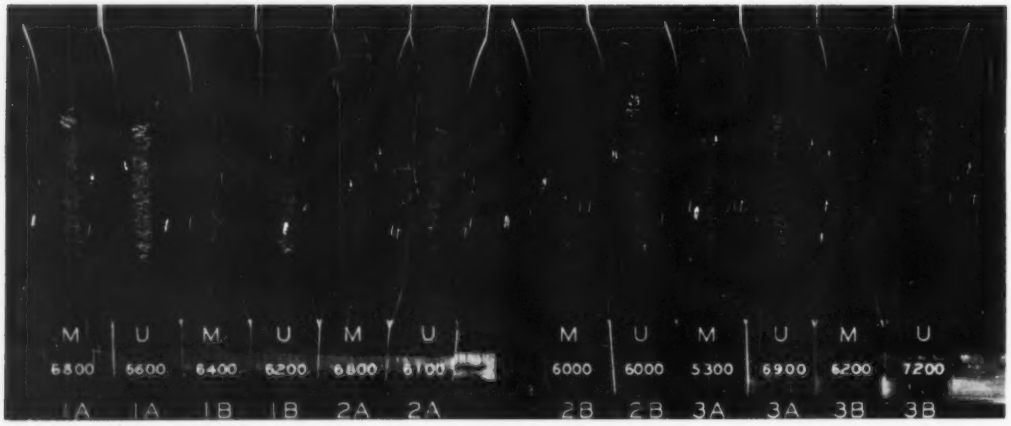
Crazed Specimens—The data (Group III, Table IV) for adjacent specimens solvent-crazed alternately on the unmasked and the initially masked faces were analyzed with the following results: 1) There seems to be no consistent effect on the tensile strength from masking, either between materials or even between sheets of the same material. 2) For all materials the standard deviation of a single measurement of tensile strength is significantly higher than for the controls. 3) Sheet-to-sheet variability is not apparent, probably because of the increased within-sheet variability.

In view of the previous finding that there was no consistent difference between specimens crazed on the unmasked and initially masked faces, the data in Groups I and II, Table IV, were analyzed to determine the day-to-day variability of the two treatments. The results of the analysis are as follows: 1) There is no evidence that Treatments I and II differ in their effect on strength. 2) The variability between results on the same material given the same treatment on different days is a) affected by a large daily effect (the same for all materials) and b) affected by additional daily variability that is not the same for all materials and that is not entirely accounted for by within-day variability.

The coefficient of variation values for the data in Groups I and II, Table IV, were calculated and examined. It was found that the coefficient of variation of the tensile strength does not vary significantly between materials or between the two treatments and is equal on the average to 15 percent; the day-to-

(*Continued on p. 223*)

Fig. 2—Tensile specimens of Lucite HC201, Sample L1d, crazed by Treatment II, Table IV. The face on which the benzene was applied is indicated as M for masked and U for unmasked. The designations 1A, 1B, and so forth indicate the half-sheet from which the specimen was taken. The tensile strength in p.s.i. is shown below each specimen. Crazing treatment caused fewer cracks on masked than on unmasked side



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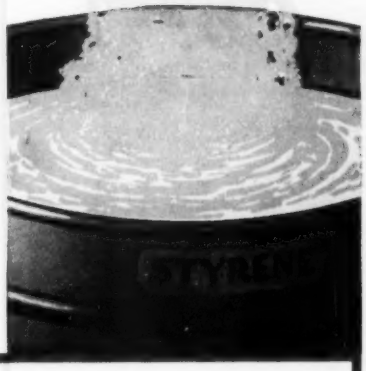

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PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed.

Materials

ADVANCES IN THE CHEMISTRY AND PROCESSING OF POLYURETHANES. Z. Höchtlen. Kunststoffe *42*, 303-10 (Oct. 1952). The latest development of the polyurethanes in the field of plastics is reviewed. Their possible application as adhesives and protective and decorative coatings is discussed in connection with the development of the new polyurethane, Desmodur AP (stable). The main subject is the chemistry and processing methods of the linear "U" polyurethanes, Vulcollan and Moltoprene used in plastics.

CELLULOSE ACETATE BUTYRATE. E. E. Halls. Plastics (London) *17*, 347-8 (Dec. 1942). The properties of molded cellulose acetate butyrate and cellulose acetate, with particular emphasis on dimensional stability, are compared.

COMPOSITION AND PROPERTIES OF ALKYD MOLDING MATERIALS. J. H. Bennitt. Brit. Plastics *25*, 416-17 (Dec. 1952). The synthesis of the resin and the properties of alkyd molding compounds are described briefly.

PHYSICAL PROPERTIES OF FLAME-RETARDANT POLYTHENE. E. I. Cooke. Brit. Plastics *26*, 19, 36 (Jan 1953). The properties of a polyethylene formulated to be flame-retardant are reported. The flame retardancy is obtained by incorporating special pigments and plasticizers such as antimony trioxide and chlorinated paraffin wax.

NEW PROCESS FOR THE MANUFACTURE OF FURFURYL ALCOHOL RESIN INTERMEDIATES. E. R. Nielsen. SPE J. *9*, 10-11, 58-59 (Feb. 1953). A process is described for the synthesis of furfuryl alcohol intermediates by the hydrogenation of furfural.

EXTRUSION PLASTICITY OF A BUTADIENE-ACRYLONITRILE RUBBER. A. W. Campbell and P. F. Tryon. Ind. Eng. Chem. *45*, 125-30 (Jan. 1953). A series of esters of hydroxymethyloxazolines was prepared by condensation of polyhydroxy primary amines with organic acids. Data on butadiene-acrylonitrile stocks plasticized with these compounds are reported. When compared with dibutyl and dicapryl phthalates and tricresyl phosphate, all of the hydroxymethyloxazoline esters tested were effective plasticizers. The outstanding ones in the series are 2-nonyl-4-methyl - 4 - caproxymethyl - 2 - oxazoline and the corresponding 4-ethyl compound.

CERAMIC-FIBER PAPER ELECTRICAL INSULATION. T. D. Callinan and R. T. Lucas. Elec. Manuf. *50*, 136, 138, 242 (Dec. 1952). The characteristics of electrical insulation materials made by impregnating ceramic-fiber paper with various plastics are reported.

TRIALLYL CYANURATE HEAT-RESISTANT RESINS. H. M. Day and J. G. Affleck. SPE J. *9*, 22-25 (Feb. 1953). The synthesis and properties of triallyl cyanurate resins are described. These resins are proposed for the fabrication of heat-resistant laminates.

PROCESSES IN GLASS-REINFORCED PLASTICS. Brit. Plastics *26*, 20-23 (Jan. 1953). Recent developments in glass reinforced plastics are reviewed.

REACTIONS OF VINYLTRICHLOROSILANE AND VINYLTRIETHOXYSILANE. G. H. Wagner, D. L. Bailey, A. N. Pines, M. L. Dunham, and D. B. McIntire. Ind. Eng. Chem. *45*, 367-74 (Feb. 1953). A study of the reactions of vinyltrichlorosilane and vinyltriethoxysilane was made to appraise their utility for preparing silicone polymers and to determine their usefulness as intermediates in the synthesis of other silicon monomers. It was found that the vinyl group attached to silicon undergoes a number of reactions such as halogenation, hydrohalogenation, Friedel-Crafts reaction, Diels-Alder reaction, and polymerization through the vinyl group. Under special conditions hydrolysis of vinyltrichlorosilane gives soluble siloxanes, which appear to be chains of cyclotetrasiloxanes. The results have also shown fundamental differences in reactivity of vinyl groups in vinyltrichlorosilane, vinyltriethoxysilane, and vinylpolysiloxane. It appears that vinylsilicon compounds are of practical importance in polymer chemistry. Vinyltrichlorosilane also is a useful intermediate for synthesizing other silicon monomers such as cyclohexenyltrichlorosilane, β-phenylethyltrichlorosilane and α-chlorovinyltrichlorosilane.

Molding and Fabricating

TECHNIQUES OF MOLDING POLYTRIFLUOROCHLOROETHYLENE. C. R. Giannotta. SPE J. *9*, 38-43 (Feb. 1953). The techniques for molding polytrifluorochloroethylene are described in detail. Cleanliness of material, machine, and working conditions are essential to prevent the introduction of contaminating elements. Cycles should be uniform and well controlled. Stainless or chrome plated steel should be used on any metal surface in contact with the material. In injection molding the injection cylinder design should provide thin cross sections of flowing Kel-F for better conductivity and to avoid material degradation; die temperature should be as high as possible, 300-350° F., commensurate with ability to remove parts from the mold; temperature controllers should be of the proportioning type and adequately checked for accuracy; sprues and runner should be kept free of grease and all other contaminants and reused immediately; machine feed should be accurate and uniform; high injection pressures up to 40,000 p.s.i. are desirable. In compression molding molds should be heated to a temperature of 500° F. and cooled under pressure; material should be thoroughly plasticized before cooling; deep draw molds should be vented to prevent air entrapment; parts should be quick quenched for greater clarity.

INJECTION MOLDING OF ELASTOMERIC VINYL MATERIALS. F. A. Martin. SPE J. *9*, 12-15, 57, 59 (Feb. 1953). The elastomeric vinyl plastics offer both a fertile field for new product development and at the same time a number of production

* Reg. U. S. Pat. Office.

molding problems to the custom molder. These materials have properties which will permit them to replace rubber in many applications, bringing to those applications plus factors of better appearance, better aging, and lower costs. In the present state of development the soft vinyls are difficult to mold in conventional type injection machines. Most of the difficulties can be traced directly to the poor plasticizing action of the heating cylinder on these materials. The factors of poor thermal stability and low thermal conductivity of the materials account for the difficulty in obtaining good plasticizing action. The use of frictional heat generated by forcing the material through small nozzle openings and through pin-point gates assists greatly in getting uniform plasticizing action with the resultant improvement in apearance of the molded piece. The screw pre-plasticizing type of injection molding machine presents many advantages as a means of molding vinyls. Among these advantages are relative freedom from thermal degradation, more uniform plasticization, increased plasticizing capacity, and faster molding cycles. Material savings can also be obtained by molding directly from pre-blends rather than from granular materials.

Applications

FOAMED PLASTICS REPLACE PLASTER CASTS. H. A. Schwab. Kunststoffe 43, 8 (Jan. 1953). Foamed polystyrene, polyvinyl chloride, or polyurethane are being tested by physicians to replace plaster casts. These thermoplastics are easily formed, flexible, clean, and allow respiration. X-rays penetrate these materials, allowing the observation of fractures without cast removal.

Properties

RATE OF ION EXCHANGE. E. R. Gilliland and R. F. Baddour. Ind. Eng. Chem. 45, 330-37 (Feb. 1953). The rate of the exchange of sodium and hydrogen ions between solution and resin phases was studied in packed beds of spherical particles of Dowex 50 to determine the effect on the rate of particle diameter, solution flow rate, solution concentration, and bed dimensions. Over the range of variables tested, the results show that the resistance in both the liquid and the solid phase are important

in determining the total resistance to ion exchange. The rate constant is not a function of bed height or bed diameter (except as this affects solution flow rate), so long as the column diameter is at least twenty times the particle diameter. An assumption that the rate of ion exchange is limited by the rate of transfer of ions to the liquid-solid interface permits the derivation of a rate equation which correlates the data over the range covered. This equation describes conditions from a knowledge of fundamental properties of the ionic solution and of the exchange material.

Testing

DETERMINATION OF SPECIFIC HEAT VERSUS TEMPERATURE OF SEVERAL PLASTIC MATERIALS. T. Gast. Kunststoffe *43*, 15-18 (Jan. 1953). Comparative determination of the specific heat of several polyvinyl chlorides with and without plasticizers were made in (1) a calorimeter filled with water, (2) a steam calorimeter, and (3) a calorimeter with a constant heat stream. All three methods were found suitable.

Coatings

POROSITY OF PAINT FILMS. WATER VAPOR ADSORPTION AND PERMEABILITY. S. Eckhaus, I. Wolock, and B. L. Harris. Ind. Eng. Chem. *45*, 426-8 (Feb. 1953). The mechanism of permeability of paint films was investigated. A previous article indicated that adsorption of krypton at 68° K. cast doubt on the presence of discrete pores in unpigmented films. The results on pigment-oil systems of various pigment volume concentrations indicate progressive surface area increase with pigment volume concentration as measured by krypton adsorption, a sharp increase coinciding exactly with the critical value of the pigment volume concentration determined by concurrent permeability studies. These results seem to indicate that discrete pore formation occurs as the pigment volume concentration exceeds this critical value. The study is of importance in indicating the mechanism of permeability to water vapor of overpigmented films. The adsorption technique could be used to predict the critical pigment volume concentration where preparation of permeability samples was difficult or impossible.

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U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25¢ each.

PANEL. C. R. Faelten (to Pittsburgh Plate Glass). U.S. 2,627,297, Feb. 3. Panel composed of resins and fibrous filler.

GASKET. G. C. Martin and A. J. Sears (to General Electric). U.S. 2,627,482, Feb. 3. Gasket of glass fibers bonded with heat-curable resin.

RESINS. F. G. Lum (to California Research). U.S. 2,627,508, Feb. 3. Long oil alkyd resins.

RESINS. J. A. Arvin (to Sherwin-Williams). U.S. 2,627,509, Feb. 3. Vinyl copolymers.

COPOLYMERS. E. Zerner and M. W. Pollock (to Sun Chemical). U.S. 2,627,512, Feb. 3. Copolymers of acrylonitrile with N-acroyl—N'-alanyl methylene diamides.

CELLULOSE ESTERS. B. B. White and P. Blackman (to Celanese). U.S. 2,627,515, Feb. 3. Production of cellulose esters.

MOLDING. F. S. Farley (to Watson-Stillman). U.S. 2,627,630, Feb. 10. Injection molding machine.

TILE. J. J. Lopina. U.S. 2,627,744, Feb. 10. Interlocking plastic tile.

LAMINATE. F. R. Loetscher (to Farley and Loetscher). U.S. 2,628,-144, Feb. 10. Resin-metal laminate.

POLYETHYLENE. H. Jenett (to Emhart Manufacturing). U.S. 2,628,172, Feb. 10. Polyethylene dispersion applied to polyethylene surface.

ANTISTATIC COATINGS. S. A. Simon and A. H. Drelich (to Chicopee Manufacturing). U.S. 2,628,176, Feb. 10. Antistatic coatings for resins.

ACRYLIC ESTERS. R. E. Burnett and B. W. Nordlander (to General Electric). U.S. 2,628,178, Feb. 10. Polymerizing oxygenated dipropylene glycol dimethacrylate.

POLYSTYRENE. R. L. Iverson (to Koppers). U.S. 2,628,180, Feb. 10. Bonding polystyrene with styrene monomer.

ION EXCHANGE. W. Shive (to Research). U.S. 2,628,186, Feb. 10. Vitamin purification with carboxylic ion exchange resin.

ION EXCHANGE. G. F. D'Alelio (to Koppers). U.S. 2,628,193, Feb. 10. Sulfonated thermosetting vinyl resins.

MIXING. A. N. Gray (to Western Electric). U.S. 2,628,204, Feb. 10. Mixing thermoplastics with plasticizers.

PLASTICIZERS. P. V. Smith, Jr., D. W. Young, and R. G. Newberg (to Standard Oil). U.S. 2,628,207, Feb. 10. Terephthalate ester plasticizers.

ALKYD RESINS. C. F. Fisk (to U.S. Rubber). U.S. 2,628,209, Feb. 10. Oxygenated polymerizable esters as cure accelerators and as copolymers.

STABILIZERS. G. P. Mack and E. Parker (to Advance Solvents and Chemical). U.S. 2,628,211, Feb. 10. Polystannoxanediol esters as stabilizers for polyvinyl chloride.

COPOLYMERS. J. B. Rust (to Montclair Research and Ellis-Foster). U.S. 2,628,213, Feb. 10. Copolymers of silicanols and hydrogen-bonded to silicon.

POLYETHYLENE. P. S. Pinkney and R. H. Wiley (to Du Pont). U.S. 2,-628,214, Feb. 10. Mixing polyethylene with benzoyl peroxide and heating to cure.

COPOLYMER. M. J. Hunter and L. A. Rauner (to Dow Corning). U.S. 2,628,215, Feb. 10. Phenylmethyl dialkoxy silane-polyhydric alcohol-dicarboxylic acid copolymer.

POLYAMIDES. E. E. Magat (to Du Pont). U.S. 2,628,216, 7-8-9, Feb. 10. Preparing polyamides from dinitriles and disecondary alcohols or ditertiary diolefins.

COPOLYMER. E. Arundale and F. W. Banes (to Standard Oil). U.S. 2,-628,220, Feb. 10. Alkyl maleate-vinyl ester copolymer.

COPOLYMERS. F. D. Marsh (to Du Pont). U.S. 2,628,221, Feb. 10. Copolymers of vinyl esters and tert-amino nitrogen compounds.

POLYMERIZATION. K. Nozaki (to Shell). U.S. 2,628,222, Feb. 10. Emulsion polymerization of methacrylonitrile.

POLYMERIZATION. J. C. Richards (to Du Pont). U.S. 2,628,223, Feb. 10. Controlled polymerization of acrylonitrile.

POLYMER. T. L. Cairns and J. C. Saucer (to Du Pont). U.S. 2,628,224, Feb. 10. Polymer of an N-monovinyl substituted amide.

POLYMERIZATION. T. S. Tutwiler (to Standard Oil). U.S. 2,628,225, Feb. 10. Polymerization of methacrylate esters with benzoyl peroxide-benzoinferric laurate catalyst.

CELLULOSE ESTERS. L. J. Rosen, L. Kruth, and B. B. White (to Celanese). U.S. 2,628,232, Feb. 10. Lower aliphatic acid esters of cellulose.

DIE. H. T. Thornberg (to Modern Plastic Machinery). U.S. 2,628,386, Feb. 17. Web extrusion die.

RESINS. T. R. McElhinney and T. D. Woodruff (to Valite). U.S. 2,-628,917, Feb. 17. Resins from pine-wood pitch and furfural.

COATING. F. J. Carlin (to U.S. Rubber). U.S. 2,628,922, Feb. 17. Coating glass with polymeric olefinic esters of alkenols to improve adhesion.

POLYSTYRENE. L. L. Yaeger (to Nash-Kelvinator). U.S. 2,628,923, Feb. 17. Polystyrene coated with a cellulose mixed ester.

CELLULAR MATERIALS. W. J. Wayne (to Du Pont). U.S. 2,628,945, Feb. 17. Cellular polymeric materials.

FIRE RETARDANTS. W. Juda, G. Jones, and N. Altman (to Albi Manufacturing). U.S. 2,628,946, Feb. 17. Fire-retardant cyanamide resins.

EMULSION. W. G. Kunze and R. B. Evans to Du Pont). U.S. 2,628,948, Feb. 17. Polyvinyl acetate emulsion containing a glycerol acetate.

POLYVINYL ACETAL. F. T. Buckley (to Monsanto). U.S. 2,628,950, Feb. 17. Mixture of polyvinyl acetal and polyvinyl alkyl ether.

STABILIZER. G. C. Claver, Jr. (to Monsanto). U.S. 2,628,951, Feb. 17.

DESIGN and PRODUCTION NEWS

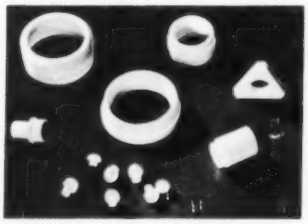
FOR PLASTICS AND MATERIALS ENGINEERS

Published by TECHNICAL SERVICE, Chemical Manufacturing Division, The M. W. KELLOGG Company JUNE 1953

Corrosion, Moisture Interference Eliminated in Immersion Gauge

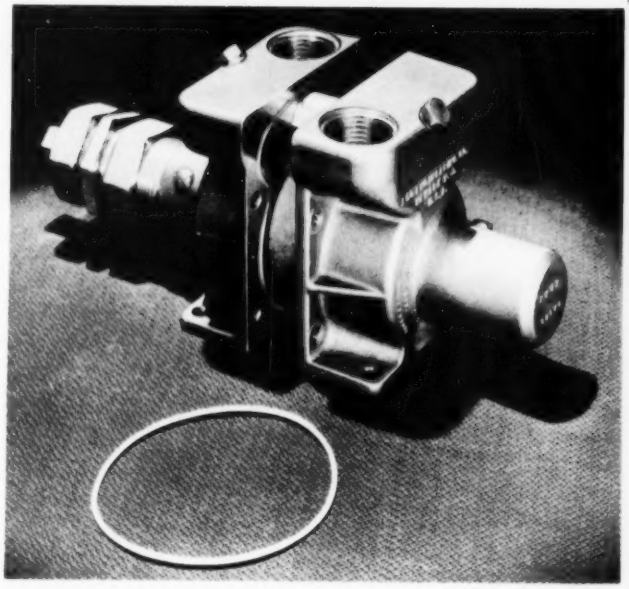
The difference between dependable "laboratory" accuracy or complete breakdown for a rugged immersion-type electronic fuel gauge may be attributed in part to its 59 machined Kel-F polymer parts, samples of which are shown here. Used primarily as dielectric insulators to isolate each of the three "probe" tubes which act as capacitor surfaces, the plastic parts are also subjected to constant vibration, corrosion from aircraft sludges and fuels, wear, and random concentrations of moisture.

The three-tube probe of the instrument which senses the weight of fuel in an aircraft tank may be completely or partially immersed at all times in volatile aircraft or jet fuel at temperatures ranging from minus 60° to 200°F. The unusual chemical inertness of the Kel-F—resisting corrosion or erosion of machined surfaces by the fuel or sludge—prevents any change in the critical spacing of .1" between the capacitor tubes essential to accuracy in the instrument readings. Electrical isolation of each capacitor tube surface is complete due to the excellent dielectric strength of Kel-F plastic. Dependable insulation, free from surface shorting or grounding caused by moisture or residues found in the fuel, is assured by the zero water absorption and non-stick characteristics of Kel-F.



The precision insulating parts required for this electronic instrument are produced by the Tri Point Manufacturing Company of Brooklyn, N.Y. Tri Point uses rod and tubing extruded from Kel-F polymer and then machines the necessary parts on standard automatic screw machines. The ready machinability of Kel-F permits this company to maintain tolerances within .001" on all parts supplied to the Aviation Engineering Corporation of Woodside, N.Y., manufacturers of this aircraft instrument.

Refer to Report E-108



"Live" Seal of KEL-F® in Chemical Pump Permits Safe, Air-Free Liquid Transfer at Constant Rates

Designed to handle nitric acid, hydrogen peroxide and other hazardous and non-hazardous chemicals at from ½ to 10 gpm, this stainless steel pump takes advantage of Kel-F polymer chemical inertness to insure safe operation. The polymer "O" ring seal, installed in a machined groove in mating pump halves, remains flexible at all operating temperatures, preventing escape of corrosives or entrainment of air.

The high compressive strength of Kel-F trifluorochloroethylene polymer and low "cold flow", which enable the ring to retain its form under pressure, maintain the pumping chamber at a constant volume thereby insuring constant pumping flow rates. The non-adhesive characteristic of Kel-F prevents the "O" ring from "setting" permanently in the seal groove, making dismantling of the pump for inspection a much easier task.

The "O" ring seal of Kel-F used in this positive displacement chemical pump is produced by the Young Development Laboratories of Rocky Hill, N.J. for the Eco Engineering Company of Newark, N. J. who manufactures the "All Chem" pump. Young Laboratories extrude Kel-F in rod form on a standard batch extruder, then fabricate sections of rod into "O" rings by a special heat sealing method developed for this purpose. Higher strength is claimed for the "O" ring produced from this rod because in the extrusion process the polymer is maintained at high temperature for less time than that required by standard extrusion. When completed, the ring is smooth and without evidence of the heat-sealed joint.

Young Development Laboratories also produce a line of resilient core rings jacketed with Kel-F and two types of chemical gaskets—solid Kel-F and Kel-F laminated with glass fabric and silicone rubbers. Other specialties, for which this company designs and builds its own equipment, include sheets and discs of Kel-F polymer; extruded rod and tubing; compounded extrusions of Kel-F and graphite, metals or glass fiber; and solid bars and tubes of Kel-F in large sizes.

Refer to Report E-107

(SEE REVERSE SIDE)

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MOLDING POWDERS

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FLUORO CHLORO CARBON PLASTIC

KEL-F

DISPERSION COATINGS

KEL-F

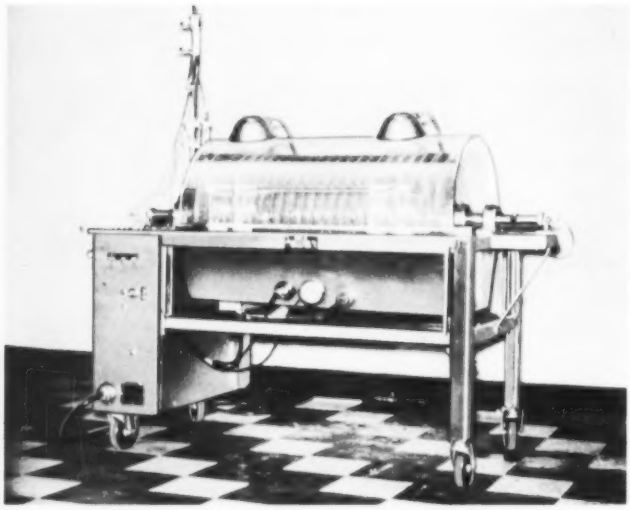
TRIFLUORO CHLORO ETHYLENE POLYMERS

KEL-F

OILS WAXES GREASES

DESIGN and PRODUCTION NEWS

CONTINUED FROM PRECEDING PAGE



KEL-F Permits Absolute Sterility, Prevents Blood Contamination in "Artificial Kidney"

Repeated steam-sterilization, freedom from contamination of treated blood and prevention of loss of the vital fluid from the apparatus were prime specifications for material to be used in the rotating coupling and blood return pump of the clinical dyalizer or "kidney" shown here.

Kel-F trifluorochloroethylene polymer was picked for this job from among many other materials because of its chemical inertness. The non-stick characteristic of Kel-F also helped to prevent contamination as well as incipient coagulation of blood—blood solids or residues will not cling to Kel-F. Contamination from absorbed material was naturally precluded by the non-porosity of the polymer.

The excellent heat resistance of Kel-F and its dimensional stability at both high and low temperatures, permit repeated sterilization of parts at temperatures up to 260°F. without cracking, chipping or distortion of the plastic. The high compressive strength and low "cold flow" made possible a consistently "tight" joint in the rotating coupling, excluding any loss of blood from the equipment at this point.

The clinical dyalizer or "artificial kidney" is manufactured by the Edward A. Olson Manufacturing Company of Ashland, Mass. for use by the medical profession in treating cases where normal kidney function is impaired. Blood is purified through permeable membrane dialysis. The Kel-F polymer parts used in the equipment are machined by the Olson company from extruded polymer rod and tubing supplied to them by the Plax Corporation of Hartford, Conn.

In addition to choosing Kel-F because of its unique combination of chemical and mechanical properties described, the Olson company found that the precision tolerances required in the parts could be more readily obtained with Kel-F than with any other material tested.

Refer to Report C-106

Get the Whole Kel-F Story at the Basic Materials Show!

The largest and most complete exhibit of Kel-F polymers and finished products ever displayed—that's Kellogg's Booth 56 at the Basic Materials For Industry Exposition, June 15 through 19 in New York City. At the new exhibit you will be able, in a few moments, to acquaint yourself with the extremely wide scope of application of Kel-F molding powders, waxes, greases, oils and dispersion coatings. And, you'll be able to obtain the latest technical data on Kel-F as well as examine more than 125 Kel-F polymer products on display.

Make a point to visit the Kel-F polymer exhibit . . . June 15-19.

Molders of the Month

Leading molders and extruders specialize in fabrication of materials and parts made of Kel-F . . . each month this column will spotlight several of these companies with their principal services and products.

American Molding Company
San Francisco, Calif.
Injection Molding
Electronic Components

Federal Telecommunication Laboratories, Inc.
Nutley, N. J.
Insulated Wire, Tubing

Garlock Packing Company
Palmyra, N. Y.
Gaskets, Packings, "O" Rings
Injection, Compression Molding

H. & R. Industries
Nazareth, Pa.
Extruded Rod, Tubes, Shapes
Injection Molding

Kurz-Kasch, Incorporated
Dayton, Ohio
Compression Molding
Plunger Molding

W. S. Shamban & Company
Culver City, Calif.
Extrusions, Rods
Injection Molding
Compression Molding,
"O" Rings
RF Sealing of Film

For complete information regarding any item mentioned in DESIGN AND PRODUCTION NEWS, ask for detailed APPLICATION REPORTS, write

® Registered trademark of The M. W. Kellogg Company's trifluorochloroethylene polymers.

Polymers stabilized with amine oxides.

COPOLYMERS. H. Gilbert (to B. F. Goodrich). U.S. 2,628,954, Feb. 17. Copolymers of vinylidene cyanide and acrylonitrile.

INTERPOLYMERS. C. I. Parrish (to B. F. Goodrich). U.S. 2,628,955, Feb. 17. Interpolymers of a monoisoolefin and a monomeric fulvene.

COPOLYMERS. H. Tucker (to B. F. Goodrich). U.S. 2,628,957, Feb. 17. Vinyl chloride—styrene copolymers.

POLYMERS. J. A. Bittles (to Du Pont). U.S. 2,628,958, Feb. 17. Polymerizable esters of alpha-methylene carboxylic acids.

MILLING. A. W. Hanson and W. E. Donaldson (to Dow). U.S. 2,629,129, Feb. 24. Machine for milling plastics.

MOLDING. T. N. Willcox, M. E. Gale, and K. R. Stadthaus (to General Electric). U.S. 2,629,132, Feb. 24. Apparatus for plasticizing and feeding plastic material.

HOLLOW ARTICLES. R. P. Molitor (to Sun Rubber). U.S. 2,629,134, Feb. 24. Molding hollow vinyl resin articles.

STERILIZER. P. Kollsman. U.S. 2,629,148, Feb. 24. Sterilizer for thermoplastic articles.

CELLULAR RESINS. R. F. Sterling (to Westinghouse). U.S. 2,629,698, Feb. 24. Cellular thermoset resins.

STABILIZER. S. S. Caldwell, G. J. Chertoff, and G. B. Curtiss. U.S. 2,629,700, Feb. 24. A stannous organic acid salt as stabilizer for vinyl halide resins.

RESINS. G. K. Vogelsang (to Borden). U.S. 2,629,703, Feb. 24. Phenol-aldehyde and ketone-aldehyde products.

RESINS. M. Degroote and B. Keiser (to Petrolite). U.S. 2,629,704-5-6, Feb. 24. Oxyalkylated resin derivatives.

POLYMERIZATION. C. A. Uraneck, R. J. Goertz, and A. C. Rothlisberger (to Phillips Petroleum). U.S. 2,629,708-9, Feb. 24. Emulsion polymerization of vinylidene compounds in the presence of carbamates.

COPOLYMERS. C. H. McBurney. U.S. 2,629,710, Feb. 24. Halomethylated vinyl aromatic copolymers.

ACRYLONITRILE. T. E. Stanin, H. W.

Coover, and J. B. Dickey (to Eastman Kodak). U.S. 2,629,711-2, Feb. 24. Polymers of acrylonitrile.

RESINS. M. T. Goebel (to Du Pont). U.S. 2,629,713, Feb. 24. Hydrolysis of polymeric esters.

ESTERS. P. W. Morgan (to Du Pont). U.S. 2,629,716, Feb. 24. Hydrolysis of polymeric esters.

SEALING. L. A. Ulmschneider (to Eastman Kodak). U.S. 2,629,808, Feb. 24. Apparatus for heat sealing thermoplastics.

SEALING. J. Frye. U.S. 2,629,809, Feb. 24. Apparatus for heat sealing thermoplastics.

PIPE. H. D. Boggs (to H. D. Boggs). U.S. 2,629,894, Mar. 3. Molded fiber-filled threaded plastic pipe.

EXTRUSION. C. D. Orsini (to Nixon Nitration). U.S. 2,629,898, Mar. 3. Extrusion dies.

CELLULAR POLYSTYRENE. E. R. Aller (to General American Transportation). U.S. 2,629,899, Mar. 3. Smoothing and shaping cellular polystyrene.

MOLDS. R. H. Hugger (to U.S. Rubber). U.S. 2,629,907, Mar. 3. Mold lined with polyamide sprayed with metal.

ADHESIVE. J. C. Cowan, L. B. Falkenburg, and A. J. Lewis (to U.S.). U.S. 2,630,397, Mar. 3. Bonding glassine with a polyamide resin.

CHLOROSULFONATED POLYETHYLENE. R. E. Brooks, F. S. Chance, T. H. Crim, Jr., and D. E. Strain (to Du Pont). U.S. 2,630,398, Mar. 3. Bonding chlorosulfonated polyethylene to fabric.

RESIN. G. C. Stoecker and H. L. Keil (to Armour). U.S. 2,630,414, Mar. 3. Reaction products of protein, and aromatic amine, and an aldehyde.

COPOLYMERS. H. L. Gerhart (to Pittsburgh Plate Glass). U.S. 2,630,415, Mar. 3. Copolymers of drying oils, cyclopentadiene, and terpenes.

TETRAFLUOROETHYLENE. J. F. Loutz (to Du Pont). U.S. 2,630,417, Mar. 3. Tetrafluoroethylene compositions containing lubricants of the chlorinated type.

POLYVINYL HALIDES. J. Dazzi (to Monsanto). U.S. 2,630,418, Mar. 3. Vinyl halide plasticizers.

NEW MACHINERY AND EQUIPMENT

BLASTING MACHINE—Model 30 is a wet blasting machine introduced by American Wheelabrator & Equipment Corp., 1254 S. Byrkit St., Mishawaka, Ind. It is intended for precision cleaning, finishing, and reconditioning on small pieces which can be handled manually. These may include stamping, die-casting, and drawing dies; plastic, glass, and small rubber molds; valves, pistons, and rods; and similar items.

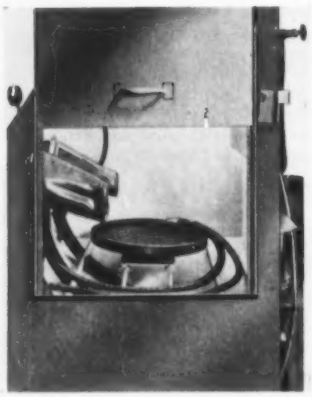
The machine, 2 ft. 6 in. long, 2 ft. 6 in. wide, and 6 ft. 11 in. high, has a blasting compartment 30 sq. in. in area and 2 ft. 7 in. in height. The vertical sliding door at the side of the machine is 1 ft. 10½ in. wide and 1 ft. 7 in. high. A 15-in. diameter rotating work table to hold the work in the compartment and auxiliary portable tanks to receive parts for rinsing are available.

The abrasive slurry is made up of 25 lb. of abrasive and 5 gal. of water and is propelled by compressed air. Since fine mesh abrasives from 80 to 2500 mesh are used, tolerances as low as 0.0001 in. can be maintained where required.

Model 30 has a set of armholes on the front of the cabinet to which gauntlets are attached. The operator, his arms extended through the gauntlets, manipulates the abrasive gun with his hands while operating the compressed air valve with his knee.

The machine is equipped with a number of push button controls located on a central control panel near the work station. The unit is also equipped with a vertical pump for slurry agitation and recirculation. The position of the pump eliminates all suction piping, valves, and fittings.

American Wheelabrator's Model 30 blasting machine with door open. Operator's arms are protected by set of gauntlets



INDUCTION NEUTRALIZER—Neutralization of static electricity generated during calendering, coating, drying, or similar operations is accomplished by an induction neutralizer marketed by Herman H. Sticht Co., Inc., 27 Park Pl., New York 7, N.Y.

The unit consists of small tufts of wire bristles mounted at some distance apart on a wooden bar and grounded to the processing machine. Ionization of the air between the neutralizer and the electrified stock is caused by the voltage induced on the grounded wire bristles from the electric field of the static electricity residing on the stock. Thus, the wire bristles are energized only when the stock is electrified. The higher the electrification of the stock, the higher will be the ionization of the air and the consequent neutralization of static electricity. Since the unit operates on induced electricity, no external source of power is required.

In use, the neutralizer, called "Magic Wand," is installed across the width of the stock so that the stock is fully covered by the tufts. It is located at each point where high static voltages exist, and is attached to the frame of the machine. The bare copper wires at each end of the neutralizer are then connected and soldered to a ground wire at each side of the machine.

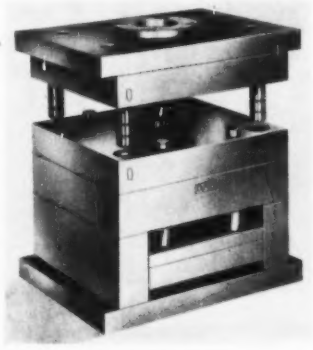
FINISHING UNIT—For burnishing, de-burring, and cutting-down operations, a barrel finishing unit has been designed by the Abbott Ball Co., Railroad Pl., Hartford, Conn. along the lines of their high, vertical type.

Power is supplied by an electric motor mounted on the barrel pedestal. A reduction drive is attached directly to the barrel shaft, and linkage between the motor and the reduction unit is provided by "V" belts and sheaves. A push-button safety switch controls the unit and can also be used to jog the barrel to any desired position. End plates and side walls are interchangeable, so that selective replacement is possible.

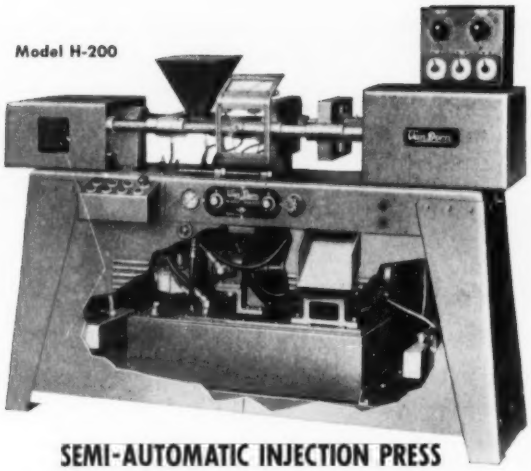
The barrels are made in four standard sizes, and come in 10 basic combinations with single, double, and triple compartments. Standard barrel I. D. sizes for single barrels equipped with maple linings are 24 by 8 in., 24 by 16 in., 30 by 8 in., and 30 by 16 inches. Barrels used for de-burring or cutting-down operations do not have the lining.

MOLD BASE—A 9- by 8-in. mold base series (No. A-R), engineered for use in small injection molded presses, is being produced by Detroit Mold Engineering Co., 6686 E. McNichols Rd., Detroit 12, Mich. The series offers a usable cavity area of over 48 sq. in. and fits easily into an injection press having a tie bar clearance of only 8 in. and a maximum shut length of only 8½ inches. This increase in cavity area without an increase in outside dimensions makes

DME's series A-R mold base has usable cavity area of over 48 sq. in., is adaptable to variety of molding machines



Model H-200



SEMI-AUTOMATIC INJECTION PRESS

2-oz. capacity. Van Dorn's engineering experience has scored again with this leader among all injection presses of its class. Its ultra-modern design insures faster operating cycles—up to 6 per minute. Push button controls are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.

VAN DORN

Plastic Equipment

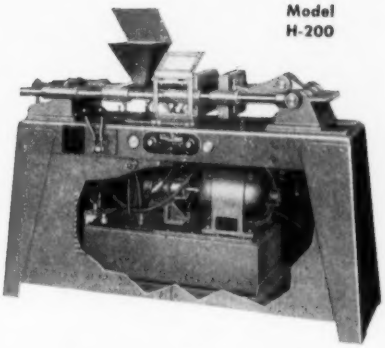
COSTS LESS to Buy...to Operate!

Van Dorn presses are *unexcelled in efficiency* and *unequalled in economy* on the innumerable jobs where a 2-oz. injection is ample. Costwise, Van Dorn presses are outstanding for these reasons:

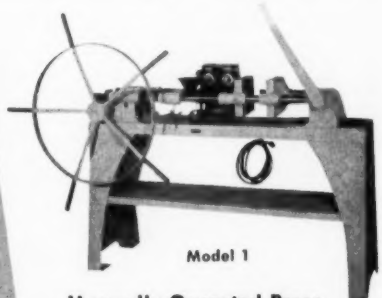
1. **Surprisingly low in price**
2. **Operate 8 hours for a few dollars**
3. **Use less expensive molds**
4. **Easily set up by one man in a few minutes**

These presses mold practically all thermoplastics including nylon . . . Look over the Van Dorn presses and plastic equipment shown—*then write for detailed Bulletins on individual machines.*

Model H-200



Power Operated, Lever Controlled Presses—Available in 2-oz. or 1-oz. models. These profit-makers feature: Rugged all-welded construction; built-in safety devices; heating chamber with ample plasticizing capacity.

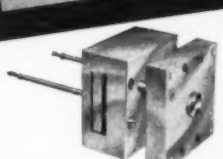


Model 1

Manually Operated Press
1-oz. capacity. Ideal for smaller jobs, experimental work, training.

Plastic Grinder
Grinds up rejects, waste, etc., for re-use. Ruggedly made, easily cleaned.

Model G-100



Mold Bases
. . . Available from stock for all Van Dorn presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO
Cable Address: "VANDORN" Cleveland

the base practical for a wider range of molding jobs.

It is adaptable for use in a variety of molding machines. Since the maximum shut height on many injection presses is limited, the A-R series is available with or without rear clamping plate. This has been made possible by counter-boring the screw holes in the bottom of the parallels and seating the rest buttons in the bottom side of the ejector bar. The arrangement allows the removal of the rear clamping plate without affecting the operations of the mold base in any way.

BURRING TOOL—Fast, clean removal of burrs from molded or formed plastics pieces is accomplished by using a new hand tool available from Sales Unlimited, 9003 Wilshire Blvd., Beverly Hills, Calif. The device, known as the Roth Burring Tool, incorporates a curved rotating steel

Roth burring tool is equipped with rotating steel blade which assumes its correct cutting position automatically

blade mounted in an aluminum handle. Because the blade is free to move, it automatically assumes the correct cutting position for burr removal on straight or curved edges and circular or other shape holes.

PACKAGING MACHINE — Ping-pong balls, tennis balls, razor blades, and other solid products of similar size can be packaged in cellulose acetate, acetate butyrate, vinyl, and other packaging plastics by means of a machine developed by Thermatron Div., Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N.Y.

The unit consists of a high frequency generator, an electronic sealing press, and a turntable. A sealing electrode, mounted in the press, follows the outline of the item to be sealed.

The plastic sheeting is formed by

Reduce Plasticizer Bills 30% to 90%

That's how much you can save with S/V Sovaloid C

Big plasticizer bills are no problem when you use *S/V Sovaloid C*. It's the most economical plasticizer available for vinyl resins and nitrile rubbers—can save you from 30% to 90% when used to extend more expensive ester-type plasticizers. And it offers you all these other processing advantages:

S/V Sovaloid C *won't migrate* from your finished products . . . is completely compatible with all vinyl and nitrile rubber compounds and well suited to plastisol formulations. It gives good flexibility, excellent oil resistance and high tensile strength.

Ask your Socony-Vacuum Representative about S/V Sovaloid C.

SOCONY-VACUUM
. . . process products

Process Products

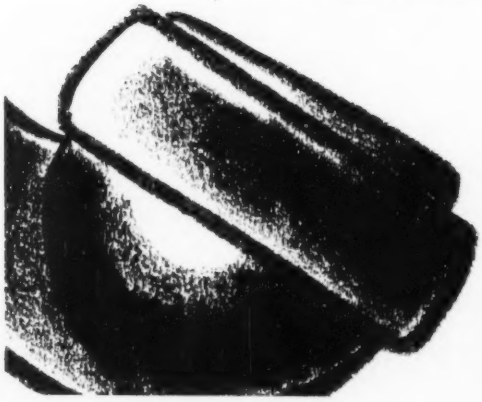
SOCONY-VACUUM OIL CO., INC., 26 Broadway, New York 4, N. Y. and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

..... and we better not delay another day.

The closing date for advertising space reservations for the '53 edition of MODERN PLASTICS ENCYCLOPEDIA is June 22nd.

Circulation?...the same as MODERN PLASTICS magazine. Publishing date is set for September.

If you don't have all the facts we'll need, write to the Advertising Department of Breskin Publications. Their address is 575 Madison Avenue, New York City 22.



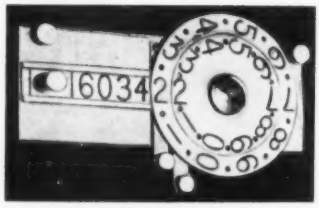
Do it now!

a molding process to create a series of cavities which snugly hold the items to be packaged. Where small items will fit completely into the cavity, a flat sheet of plastic is used as a cover. In the case of the larger objects, a mating formed cavity or dome is placed over them.

Multiple cavities or positioning devices are mounted on the turntable, evenly spaced around the circumference. As the turntable starts to move, the operator loads the first of the positions with the plastic and items to be sealed. When the loaded position comes under the press it stops and a Microswitch is thrown to close the press. At the end of the sealing cycle—usually 1 to 2 sec.—the press opens and the turntable moves to the next position.

The machine is shielded and certified to conform to FCC requirements.

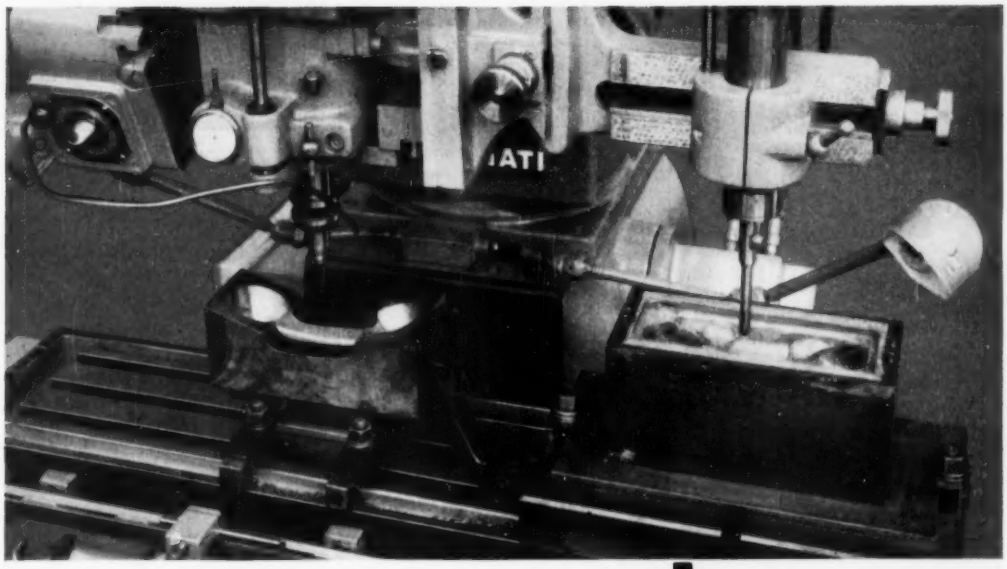
ENGRAVING ACCESSORIES—Series of consecutive numbers can be engraved more speedily on plastic and metal name plates, dials, and panels with a serial numbering dial, Part No. 411-EM151, manufactured by New Hermes Engraving Machine Corp., 13-19 University Pl., New York 3, N.Y. The attachment, which fits on the company's Engravograph, consists of two concentrically mounted dials, each numbered from



New Hermes' engraving attachment 411-EM151 has dials which reduce template changes in serial numbering

0 to 9. By proper rotation of the dials, any number can be lined up with the template containing the preceding digits. Thus, the last, or the last two digits of any number can be automatically changed without disturbing the template of the preceding digits.

Also offered by the firm is a copy holder designed to facilitate the engraving of letters and numerals at right angles. This brass holder permits horizontal engraving in one

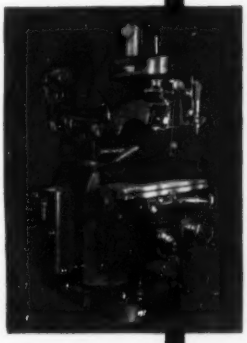


Better Molds at Lower Cost

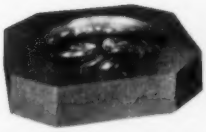
MILLED ON CINCINNATI 8" x 18"

More and more molds for low-cost attractive plastic parts are being milled on CINCINNATI 8" x 18" Tool and Die Millers. There are good reasons for the swing toward these machines. Convex and concave sections are milled to a degree of accuracy and smoothness obtainable only with CINCINNATI'S automatic hydraulic depth control unit. Reaction of the tracing finger is so sensitive that wood or plaster masters may be employed. Controls are conveniently grouped for operation while seated. Anti-friction feed screws and nuts take the work out of manual table and cross traversing. Other advantages of the CINCINNATI 8" x 18" will help you produce low-cost accurate molds for attractive plastic parts. Write for catalog No. M-1731.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



CINCINNATI 8" x 18" Tool and Die Milling Machine. You may obtain complete data by writing for catalog No. M-1731.



Mold for plastic serving tray milled on CINCINNATI 8" x 18".

Mold for chess figure, milled on CINCINNATI 8" x 18".

Mold for jewel case, milled on CINCINNATI 8" x 18".

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

continuous operation, without realignment, and is particularly applicable for marking long bands, such as terminal strips.

HYDRAULIC FLOW CONTROL—For metering or controlling the oil flow in a hydraulic system, a multi-range flow control valve has been announced by Denison Engineering Co., Columbus 16, Ohio. It is designed for operating pressures up to 3000 p.s.i. and is available in 2-port and 3-port models.

Being of the pressure compensating type, oil flow can be maintained at a uniform rate regardless of circuit pressure variation.

A 2-way adjustable orifice provides not only regulation of flow within a given range but also an optional choice of ranges to accommodate low or high volume systems.

IMPACT TESTER—A low temperature impact tester for vinyl plastic film is now being manufactured by United States Testing Co., Inc., 1415 Park Ave., Hoboken, N. J. The instrument is for use in testing low temperature impact in the recommended commercial standard for general purpose vinyl plastic film, TS-5165. Its use is also required in the standard test methods of the Plastic Coatings and Film Association.

HAND POLARISCOPE—For the detection of strains in glass and plastics, a hand polariscope for use in laboratory and factory has been announced by Pacific Transducer Corp., 11921 W. Pico Blvd., Los Angeles 64, Calif.

In the laboratory the instrument can be used to check for strains in chemical glassware and for the determination of the axes in crystal formation. In industry it may be employed for the detection of strains in clear plastics and in glass-to-metal seals.

Model 242.3 is made with an oxidized non-rusting metal frame. The polarizer is fixed in one end of the frame. The analyzer is rotatable through 180° in the other end of the frame. There is a 3¼-in. space between ends for the object under examination. A source of moderate intensity light is sufficient for the detection of strains in glass and clear plastics. The filters are made of scratch resistant Polaroid.

New Suit for the New Snorkel Pen

"Snorkel" is a trade-mark of W. A. Sheaffer Pen Co.

You can tell right away that the new Sheaffer Snorkel pen is a remarkable writing instrument. It fills without wetting the nib. Its Snorkel tube extends, draws up ink, retracts. No mess at all.

Its styling completes this feeling of cleanliness and efficiency. The barrel, cap, plunger knob and gripping section are made of BAKELITE C-11 Plastic. They're precisely molded, richly colored, strong. Dimensionally stable, the C-11 Plastic assures a long-lasting close fit for the small, finely-threaded sections. Resistance to abrasion, chemicals, and perspiration assures a lifetime of beauty.

BAKELITE C-11 Plastics are acrylonitrile-styrene copolymers that have several distinct advantages over both acrylic and styrene plastics. Their tensile and flexural strengths are 45% greater than those of standard polystyrenes. They withstand contact with food, most chemicals, soaps, detergents, coffee, tea, citrus peels, most oils, cosmetics.

Consequently BAKELITE C-11 Plastics are being used more and more for housewares, packaging, and precision applications such as high-quality drafting instruments. Perhaps your product could join the Sheaffer Snorkel fountain pen on this growing list of successful applications in widely varied fields. For information, write Dept. QL-13.

BAKELITE
TRADE-MARK

C-11 PLASTICS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
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DOLL SHOES molded of VINYLITE Elastomeric Plastic are finely detailed, flexible, scuff-resistant, easy to clean. Available in six sizes, three colors. Molded by Bolta Products Sales for Fairyland Toy Products, Inc.

WIRE CONNECTORS have shells molded of BAKELITE Phenolic Plastic that withstand 4000 volts dielectric and air gap tests, are mass-produced quickly at low cost. Made by Ideal Industries, Sycamore, Ill.

ILLUMINATED SIGN made of VINYLITE Plastic Rigid Sheet is printed in four colors, has transparent areas and intricate 3-dimensional details. It is strong, durable, easily cleaned. Made by L. A. Goodman Mfg. Co., Chicago 21, Ill.

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"British Plastics Year Book 1953," 23rd edition.

Published in 1953 by Iliffe & Sons Ltd., Dorset House, Stamford St., London S. E. 1, England. 562 pages. Price $4.20

This latest edition presents an up-to-date classified guide to the British plastics industry. The general format has been kept the same as in the past, but each of the classifications has been revised to reflect the current situation in the industry. In addition to sections on materials, manufactured products, machinery and equipment, trade names and technical terms, firm names and addresses, prominent people in the British plastics field, associations and federations, and technical data, the current edition contains, as a new feature, an annual review of patents, arranged in subject groups. Also included for the first time is a list of new companies registered during the past year, giving name, address, date of registration, field of activity, capital, and names of directors.

"Cellulose, The Chemical that Grows," by Williams Haynes.

Published in 1953 by Doubleday & Co., Inc., 575 Madison Ave., New York 22, N. Y. 386 pages. Price $4.00

Written in non-technical language that any layman will understand, this volume takes the reader on a historical trip covering the development of cellulose materials from the time of the ancient Egyptians to the present day. Writing in a narrative style the author manages to convey all the important information on the structure of cellulose, its applications, the manufacturing problems it presents, and how they have been solved. Of particular interest to those in the plastics field will be chapters 12 and 13, dealing with the uses to which cellulose has been put in the plastics industry, and describing the developments that led to the formulations of such compounds as cellulose acetate, cellulose acetate butyrate, cellulose propionate, ethyl cellulose, and cellulose nitrate. A series of appendices containing statistical and technical data, and a glossary of terms provide a considerable amount of useful information.

"Elementary Principles of the Statistical Control of Quality," by W. Edwards Deming.

Published in 1952 by Nippon Kagaku Gijutsu Remmei, Tokyo, Japan; and distributed in the U. S. by Stechert-Hafner, Inc., 31 E. 10th St., New York 3, N. Y. 103 pages. Price $2.50

Based on a series of lectures delivered by the author in Tokyo under the auspices of the Union of Japanese Scientists and Engineers, the present volume outlines the fundamental considerations that underlie the application of statistical quality control to mass production, and formulates some of the basic techniques employed (see also "Scientific Sampling," MODERN PLASTICS, April 1953, pp. 79 *ff*). As the title suggests, the treatment is as elementary as is compatible with an intelligent discussion of the theory and practice of quality control; therefore, only a minimal statistical background is necessary for a complete understanding of the book.

"Davison's Rayon, Silk and Synthetic Textiles."

Published in 1953 by Davison Publishing Co., Ridgewood, N. J. 536 pages. Price $8.00 (Deluxe Office edition), $6.00 (Handy edition).

The 58th edition of this annual register of the rayon, synthetic textiles, and silk industries in the United States and Canada presents the latest directory-type information and some basic technical data. The volume contains the following listings: A buyer's guide covering acetate, rayon, and silk; agents, dyers, throwsters, machinery, supplies, services, yarns, etc.; a list of rayon, silk, and synthetic textile manufacturers, including names and positions of major executive personnel as well as specific lines handled; a list of mills classified by product; and a directory section for commission throwsters, designers, finishers, and dyers; suppliers of raw and spun silk, dealers in synthetic fibers, yarn dealers and suppliers, and factors. A technical section at the end of the compendium outlines such data as testing procedures and principles of yarn numbering, and contains a comparative yarn table.

Casting resin—Properties and applications of a liquid thermosetting casting resin are discussed in this 16-page booklet. The resin can be cast in simple molds, requires only a short baking cycle at 140° F., and is used for short production runs, prototype work, foundry patterns, jigs, novelty castings, electroplating shields, large-part production, masking fixtures, and special electrical and corrosion resistant parts. The booklet also contains data on patterns, mold making, mold preparation, gravity and centrifugal casting, possible use of fillers, and the use of inserts. *Durez Plastics & Chemicals, Inc., North Tonowanda, N. Y.*

Polyester resins — Compounding, production methods, fabrication of reinforced plastics, and general property information on the company's line of polyester resins is presented in this 18-page booklet. The booklet also discusses various specific formulations with particular reference to fillers, catalysts, accelerators, colorants, thinners, and solvents. General details on production methods and equipment are given for casting and diaphragm, rubber plug, and match-metal die molding. Included also are lists of secondary material suppliers. *Bakelite Co., Div. of Union Carbide and Carbon Corp., 300 Madison Ave., New York 17, N. Y.*

Dry colors—Two data sheets give cost and use information on dry colorants to be used for producing the colors listed in the Monsanto toy and houseware palettes. Prices are given for the colorants in both bulk and small quantities. *Ferro Corp., 4150 East 56th St., Cleveland 5, Ohio.*

Acrylic molding powder—Molding information applicable to Plexiglas injection molding powders is contained in booklet PL-35. Covered are such topics as mold design, predrying of the powder, typical molding condition, and a list of trouble

NOW

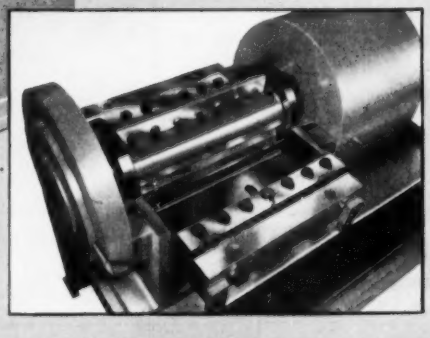
GRANULATE LARGE "TOUGH-TO-PROCESS" PLASTIC PARTS

Without Prior Bandsawing • Without Stalling Machine

Do it with the Heavy Duty, All Steel

CUMBERLAND

MODEL 20 GRANULATOR
with the 7"x20" Throat Opening



Dismantled view of cutting head (right) shows compact, efficient design.

FEATURES RUGGED CONSTRUCTION including all-steel weldments with deep welds and extra-large fly wheel for heavy blows. Prevents machine stalling!

HANDLES MANY MATERIALS including cylinder purgings, "bleeder scrap", heavy cast slabs of polystyrene or acrylic resins.

NO PRIOR BANDSAWING NEEDED because machine is specially built to handle most bulky plastic parts (which are too difficult to process on conventional machines).

PREVENTS SERIOUS "WRECK DAMAGE" if foreign object should be dropped in machine. Rugged construction solves this problem.

ATTRACTIVELY PRICED, for a large size granulator with all these features!

Write for complete details!

CUMBERLAND MANUFACTURES A COMPLETE LINE OF PLASTICS REDUCING MACHINES

Designed Specifically for Plastics . . . . To Give You Maximum Operating Efficiency and Economy

GRANULATING MACHINES (All Models)
Eight different models, direct coupled and V-belt driven, are available to meet your requirements. For complete details, request Bulletin 251.

PREBREAKER
Cuts up radio, television cabinets and other large parts. Available with 20" by 32" throat opening (Model 32) and 10"x 24" throat opening (Model 24). Write for details.

ROTARY CHOPPING & DICING MACHINE
Heavy-duty machine cuts thick vinylite slabs from two roll mills. Modified as a dicer, it dices sheet stock into small cube sizes.

CUMBERLAND Engineering Company Inc.
BUILDERS OF BETTER MACHINES FOR THE PLASTICS INDUSTRY
DEPT. 1 • BOX 216 • PROVIDENCE • RHODE ISLAND

California Representative:
WEST COAST PLASTICS DISTRIBUTORS, INC.
4113 West Jefferson Blvd., Los Angeles 16, Cal.

shooting recommendations for best quality molding. Booklet PL-86a outlines the advantages of Plexiglas and also presents a properties chart for four Plexiglas molding powders. Both booklets are available from *Rohm & Haas Co., Plastics Dept., Washington Sq., Philadelphia 5, Pa.*

Organic chemicals catalog—A 92-page catalog, exceptionally well designed, gives properties, specifications, and applications of the company's solvents, industrial chemicals, resins, and plastics. One section describes the facilities of its technical service laboratory, and others deal with anhydrous ammonia fertilizers, aldrin, dieldrin, and D-D, all agricultural chemicals. The catalog concludes with a description of the company's national distribution system. Copies can be secured at any of the company's sales offices. *Shell Chemical Corp., 50 West 50th St., New York 20, N.Y.*

Price list—Broken down into carload and less-than-carload prices, this 4-page price list covers the following items: rubber blacks (channel, furnace, thermal), ink blacks (channel, furnace), color blacks (channel, furnace), Wallastonite, pine products, charcoal, plasticizers, coke, and clay. *Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass.*

Nylon molding powder—Thirty nylon molded parts are described in this 16-page booklet entitled "Nylon Molding Powder." These parts have found application in automobiles, textile machinery, home and electrical appliances, helicopters, medical equipment, toys, garment accessories, and elsewhere. The booklet also contains a properties chart for the six types of nylon powder marketed by the company. *Polychemicals Dept., E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Dela.*

Epoxy embedment—The technique of embedding electrical components in electrical insulating resin is described in this 8-page illustrated booklet entitled "Scotchcast." Applications for both Scotchcast resin No. 1 (hot pouring) and Scotchcast resin No. 2 (cold pouring) are given, the use of fillers to obtain special characteristics is discussed, and casting

NOW! **Arc Suppression**

with complete safety!

Thermatron

T. M. Reg. U. S. Pat. Off.

IMMEDIATE DELIVERY!

takes an important step forward in high frequency sealing of vinyl plastics

Here's the THERMATRON Arc Suppressor . . . the most advanced unit of its type featuring complete stoppage of all damage to electrodes, dies and costly materials; It permits the generator to be used without buffers . . . a feature that means tremendous savings in equipment and replacement costs which can pay for the unit over and over again.

Small and compact, the Suppressor fits easily on top of the THERMATRON generator, taking no extra floor space. It is designed to be incorporated with generators now operating in the field.

Advantages are many . . . . With a response of *one-millionth* of a second, the Arc Suppressor works equally well on both small and large units from ¼ KW to 20 KW. A one dial operation, it has indicating lights to show that filament and high voltage are functioning normally —and another light to show when the unit has operated to prevent arc . . . And while preventing arc, the Suppressor also breaks the plate and grid line, making unintentional recyling impossible. It breaks the timer cycle, too, and the generator is reset automatically for the next operation.

Our engineers will gladly give you further particulars on this important new development in vinyl fabrication. For complete information, write to Dept. 71.

Thermatron

DIVISION

RADIO RECEPTOR COMPANY, INC.

Since 1922 in Radio and Electronics

SALES DEPT: 251 W. 19th St., New York 11, N. Y. • FACTORY: 84 N. 9th St., Brooklyn 11, N. Y.

CHICAGO OFFICE: 2753 West North Avenue, Chicago 47, Illinois

A GOOD STABILIZER IS COLOR CONSCIOUS

That bright red color you buy to give your product sparkle and sales appeal, sometimes turns out a dull, lifeless maroon as the finished vinyl rolls from the mills. The fault, in many cases, is not with the pigment, but in the stabilizer you may be using.

A good stabilizer is formulated to give not only efficient stabilization. It should also do its job without reacting with the pigment or diluting the pigment's effect by opacification. A good stabilizer, in other words, is "color conscious", and will not complicate the pigmentation of your product.

Ferro's stabilizer line is completely "color balanced". From early development through final manufacture, the influence on pigmentation is carefully controlled. As a result, when you add a Ferro stabilizer to your plastic mix you are assured of optimum color fidelity, as well as top heat and light stabilization.

Remember that many stability tests are evaluated in pigment-free systems. For that extra protection of color fidelity, call in your Ferro representative, or write for free samples, today.

FERRO

FERRO CHEMICAL CORPORATION

A Subsidiary of Ferro Corporation

BEDFORD, OHIO

A complete line of . . . vinyl stabilizers, metallic soaps, dispersing agents, fungicides, driers, cobalt compounds, surface active agents.

ACADIA
Processors of Synthetic Rubber and Plastics • Sheets Extrusions • Molded Parts

Synthetic PRODUCTS

MANUFACTURERS AND CUTTERS OF WOOL FELTS

M&M PLASTIC PELLETERS

M & M Plastic Pelleters will produce clean cut plastic pellets that need no screening when cutting the product from extruder or compounding mill. A variable speed drive permits the Pelleter to be synchronized with the extruder or mill output. The M & M straight knife Plastic Pelleter will cut extruded plastic rods into pellets of uniform size and shape. The M & M notched knife pelleter will produce pellets of uniform size in a hexagonal shape from plastic ribbons up to 10" wide.
Write us about your needs today.

70

MITTS & MERRILL

1016 South Water Street • SAGINAW, MICHIGAN

techniques are outlined briefly. Physical and electrical properties of these epoxy type resins—moisture resistance, dielectric strength, adhesion, shrinkage, and stability over a range of temperatures—are presented in detail on a technical data page. *Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.*

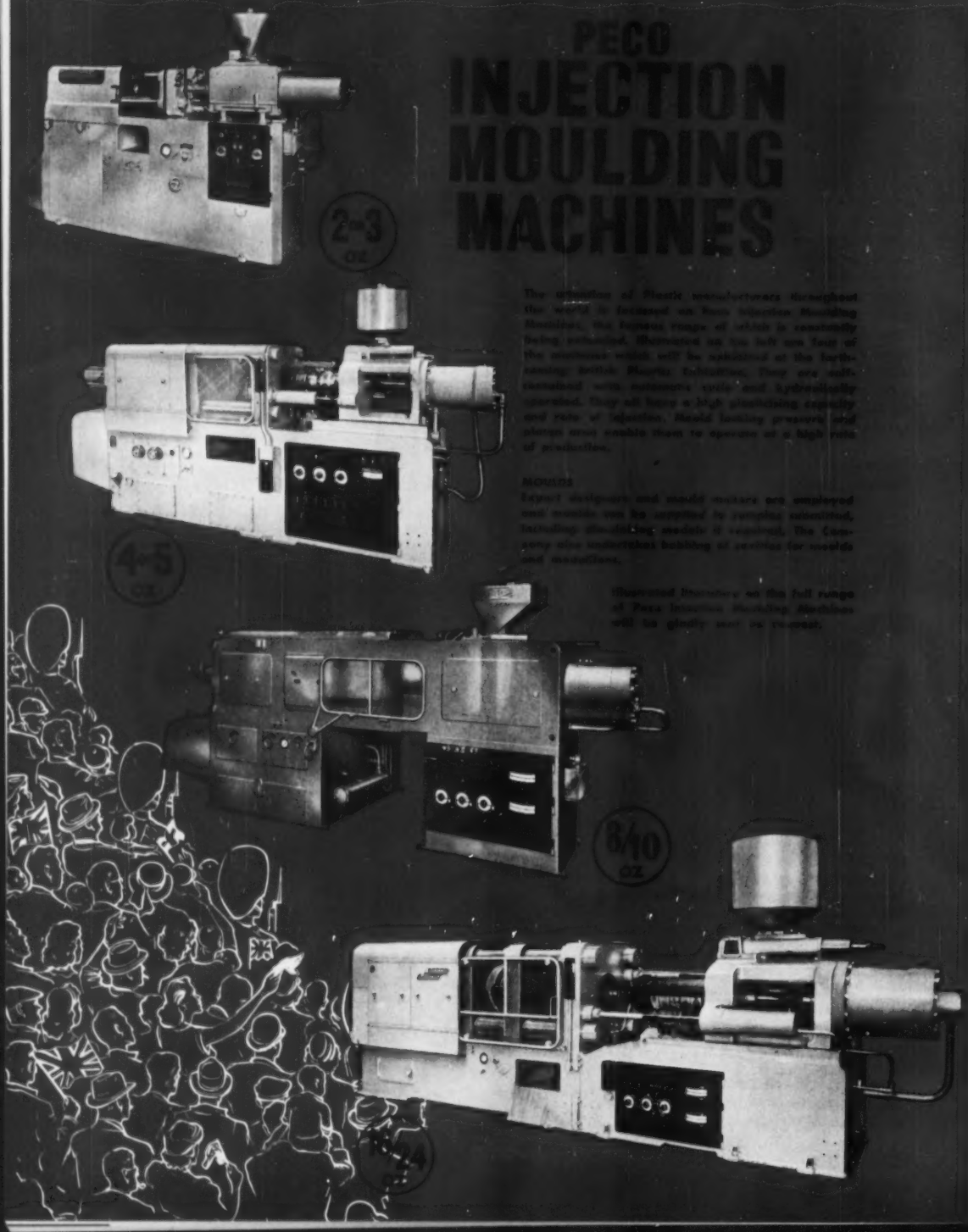
Speed variator—An eight-page bulletin, GEA-5788, describes a line of speed variator auxiliary drives for calendering coated fabric, floor covering, plastic sheet, and film. It shows how the speed variator coordinates auxiliary sections and the main calender drive without line-shafts, chains, or mechanical speed changers and points out major design features, indicating how wider speed range, greater flexibility, and controlled tension and speed can be obtained. Specific auxiliary drives for fabric tension, fabric windup, plastic film speed control, and plastic film windup are listed. *General Electric Co., Schenectady 5, N. Y.*

Mechanical deflashing—Bulletin 934 discusses mechanical blasting with soft grit pellets and describes the automatic airless blasting equipment and process for deflashing thermosetting plastics as well as deburring certain laminated plastics. Before-and-after photographs and case histories are included. *American Wheelabrator & Equipment Corp., Mishawaka, Ind.*

Polyester film—First of a series, Bulletin 1-2-53 contains information on the physical, electrical, and chemical properties of Mylar polyester film, and lists suggested applications. Among the latter are the following: *Electrical*—as a dielectric in capacitors, slot liner and phase insulation in motors; tape insulation for motor and generator field coils; insulation for magnet wire; backing for mica splittings and integrated mica. *Non-electrical*—as a base for sound recording, pressure-sensitive, electrical, and industrial tapes; liners for steel and fiber drums; protective covers for precision machinery; and many others. *Film Dept., E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.*

Aliphatic acid—Technical Bulletin No. 46 gives tentative specifications, typical characteristics, typical com-

Acclaimed All Over



the World

PECO PRODUCTS

PECO *proudly announce an addition to their famous range of machines — the*

2½" EXTRUDER

The Peco Extrusion Machines have been designed and built for the Plastics industry with a view to providing a range of machines in which all the latest features resulting from extrusion experience have been combined. These machines are constructed with the same engineering skill and attention to detail for which the Peco Injection Moulding Machines are now world-famous, and we are confident that within a very short time our Extrusion Machines will enjoy a similar reputation.

Fully illustrated literature will be gladly sent on request.

BRITISH PLASTICS EXHIBITION 1953
JUNE 8th-18th

You are cordially invited to visit our Stand A16/17 where we shall be pleased to demonstrate to you any of the following machines which we are exhibiting:

2/3 oz., 4/5 oz., 8/10 oz. and 16/24 oz. Injection Moulding Machines.
The 2½" Extruder.
A Pre-Plasticising Unit fitted to the 8/10 oz. Injection Moulding Machine.
A Mould Temperature Control Unit.

CANADIAN INTERNATIONAL TRADE FAIR 1953 June 1st-12th

The Company is also exhibiting at this Exhibition the 4/5 oz. and 16/24 oz. Injection Moulding Machines the 2 c and 10 c Die-Casting Machines. You are invited to visit their Stand No. 3123/9/31.

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The PROJECTILE & ENGINEERING COMPANY LTD

ACRE STREET, BATTERSEA, LONDON S.W. 8, LONDON

Telephone: Macaulay 1212. Telegrams: "PROFECTUS, CLAPROAD, LONDON." Cables: PROFECTUS LONDON

position data, suggested applications, and shipping information for an improved grade of pelargonic acid, 892-R. This is offered as a low-cost raw material where a medium molecular weight, saturated, aliphatic acid is required. *Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio.*

Glass fibers—This brochure offers a fine pictorial treatment of the six basic types of glass monofilaments used for air filters, battery separators, pipe wraps, etc., or, when treated with silicone or polyester resins, for reinforced plastics. Fibrous glass tapes, as well as reinforcing, surfacing, and industrial matting are available in white and colors for many decorative purposes. *Modigliani Glass Fibers, Inc., 55 W. 42 St., New York 35, N. Y.*

Colloidal carbon—Backed by facts and figures, "Colloidal Carbon—Invaluable Soot" states the case for 500 tons of smoke a day. It points out that an annual production of a billion pounds of carbon black is required to give 400 billion added miles to vehicle tires and another 50 million pounds for speed and clarity to the printed word. Outlining uses, consumption, technical data, and production methods, the booklet also includes a bibliography. *Binney & Smith Co., 41 E. 42 St., New York 17, N. Y.*

Wet and dry tumbling—Five processes for finishing metal and plastic parts by abrasive tumbling are given in Bulletin PC-52. Both wet and dry processes or a combination of the two for special problems are outlined. Types of rotating barrels, abrasive compounds, and carrier media used for cutting, smoothing, and lustering steps are given in tabular form. The bulletin suggests when and where to use the separate processes and the results achieved with each. *Tumb-L-Matic, Inc., 4510 Ballard Ave., New York 70, N. Y.*

Display merchandising — Thirteen case histories quoted in "Why People Buy . . ." demonstrate point-of-purchase techniques used in display merchandising. The 20-page illustrated booklet demonstrates the design principles involved in each case. Products included are: Bates Fabrics, Borden's Ice Cream; Du-

mont Television; Ford Motor Cars; Hoover Vacuum Cleaners; Frigidaire; Lamson Nuts and Bolts; Minute Maid Concentrates; Pepsi-Cola; Pyrex Housewares; Puerto Rican Rum; Rival Household Appliances; and, Textron Indian Head Fabrics. *Wm. Melish Harris Assoc., 52 Vanderbilt Ave., New York 17, N. Y.*

Lathes—A manual covering installation, operation, lubrication, and parts listing for the Model LT Cintilathe is available to Cincinnati Lathe users who make requests on business letterheads. "Publication S-104" contains exploded views and parts listings for both new and older models. General specifications, including shipping data, are given for the 16, 18, 20, and 24 in. Cintilathes. *Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio.*

Plastic coating—Indoor and outdoor applications of a plastic finish used both as protection and color identification on insulated refrigerant, cold water, steam, and other lines and insulated equipment are discussed in a four-page folder. The finish, called Insulcolor, can be either brushed or sprayed on. It comes in white and six colors, contains no flammable solvents, and is odorless. *Armstrong Cork Co., Building Materials Div., Lancaster, Pa.*

Industrial Safety—Problems of safety peculiar to laboratory personnel are the subject of a six-page leaflet entitled "Safety in Today's Laboratories." Here are discussed chemical burns; electric shock; fire, glass, and toxicity hazards; and the methods which are currently employed to protect against these dangers. A list of agencies dealing with problems of laboratory safety is included. *Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa.*

Rigid plastic boxes—Over 50 samples of a line of more than 200 molded styrene stock boxes are described in this illustrated 4-page brochure. The boxes in the line range in shape from square to hexagonal, from oval to heart-shaped. Covers are either of the hinged, unhinged, snap, or slide variety. Some of the boxes are translucent, some transparent, and some opaque; and many have molded-in designs. Dimensions vary, of course, from box to

box, but the range extends from less than 1 by 1 by 1 in. to 16 by 10 by 6 in. The brochure also states that, in addition to carrying this line of stock boxes, the company will custom mold boxes in rigid plastic to any specifications. Distribution is limited to residents of the United States. *Ira Harmon Co., 41 E. 42 St., New York 17, N. Y.*

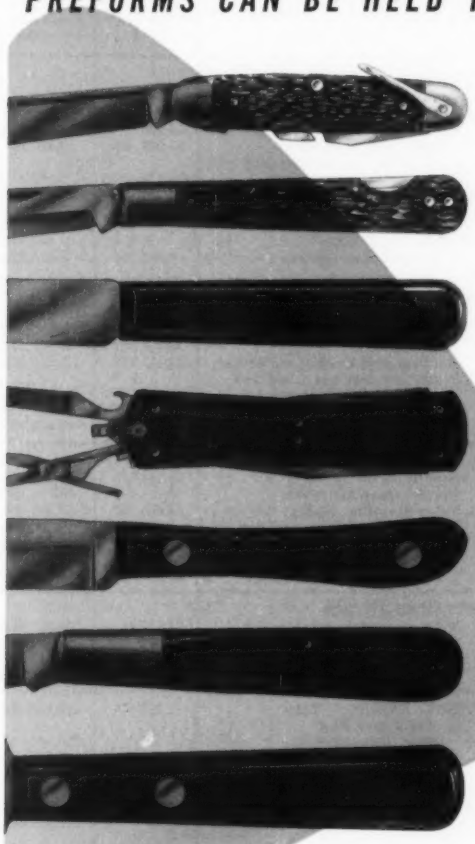
Sealing devices—An illustrated brochure describes the company's line of air, gas, and liquid sealing devices. Included are fittings which permanently seal rivets, bolts, studs, and AN fittings; gaskets for use on hatch covers, flanged fittings, hand-hole covers, and similar assemblies; electric-terminal seals for lead-throughs and standoffs in phenolic and ceramic insulators for potentials up to over 20,000 volts; and ring seals in a wide variety of sizes. *Franklin C. Wolfe Co., Inc., Dept. L-101, 3644 Eastham Dr., Culver City, Calif.*

Idea development—Services of a research and development nature, which are available to free-lance, as well as corporate inventors, are described in this 20-page booklet. The organization offering the service is non-profit. If an inventor has an idea but does not have the time, facilities, or finances to develop it, and if the idea has good technical and commercial possibilities, the organization will undertake to provide the necessary development and research service without payment of a fee. The usual agreement with free-lance inventors gives the organization exclusive rights to the invention. In return for these rights, it agrees to pay all patent costs and perform such research as may be necessary to develop the invention to the point of licensing or sale. The agreement also provides for payment to the inventor. Such payments are derived from a mutually agreed division of the royalty income received from sublicensing the invention. *The Battelle Development Corp., 505 King Ave., Columbus 1, Ohio.*

Product names—A Directory of Products describes and illustrates representative non-glass and glass products of the firm's various operating units and gives the trade names under which they are marketed. *Owens-Illinois Glass Co., Toledo 1, Ohio.*

Why ROGERS CORPORATION Impact Phenolics SPEED MOLDING OPERATIONS

PREFORMS CAN BE HELD TO CLOSE WEIGHT TOLERANCES



Rogers RX impact phenolics can be handled almost as easily as general purpose materials. One reason is that accurate weight tolerances can be held on preforms – as close as 1% if desired.

Other reasons are that Rogers RX impact phenolics are fast curing and low in bulk factor (3.5 to 1). Jobs can be run on high speed presses. And rejects caused by overloading or underloading are sharply reduced if not eliminated.

After molding, parts of Rogers phenolics have a thin flash, which can be easily removed – often by tumbling. Costly hand finishing operations are unnecessary.

Uniform pellet size of Rogers impact phenolics simplifies and speeds volumetric loading when this method is required.

HIGH SPEED PRODUCTION of knife handles is made possible by the precision with which RX phenolics can be preformed and molded in low cost shallow molds.

ROGERS RX preformable impact phenolics are available in the impact range of .05 foot pounds per inch of notch (Izod) to 1.1. For more details please write for our catalog of data sheets – Dept. P, Rogers Corporation, Manchester, Connecticut.

Better Parts for Better Products

ROGERS
CORPORATION
Established in 1832

YOU NAME IT — WE'LL MAKE IT — AND FABRICATE IT, TOO

DUROIDS	ELECTRICAL INSULATION	PLASTICS	SHOE MATERIALS
for Gaskets, Filters, Electronics . . .	for Motors, Transformers, Generators . . .	Molding Compounds and Laminates	for Counters, Midsoles, Liners

YOU SAVE WHEN ROGERS FABRICATES FINISHED PARTS

Production of

FOR the purpose of this report, production is the sum of the quantities of materials produced for consumption in the producing plant for transfer to other plants

PLASTIC AND SYNTHETIC RESIN PRODUCTION IN
From Statistics Compiled

Materials	*Total p'd'n 1952*	*Total sales 1952*
CELLULOSE PLASTICS:[a]		
Cellulose acetate and mixed ester plastics:		
Sheets, under 0.003 gage	10,886,970	11,443,984
0.003 gage and over	10,067,449	9,854,504
All other sheets, rods and tubes	5,239,438	5,018,275
Molding, extrusion materials	59,279,463	58,624,095
Nitrocellulose:		
Sheets	5,143,495	4,508,454
Rods and tubes	877,776	981,574
Other cellulose plastics[b]	6,653,214	6,475,871
PHENOLIC AND OTHER TAR ACID RESINS:		
Laminating	68,947,334	44,633,493
Adhesive	42,753,907	39,882,753
Molding and casting materials[a]	172,115,976	158,530,973
Protective coatings (modified and unmodified except by rosin)	26,689,526	23,557,726
Miscellaneous uses	65,776,828	60,408,721
UREA AND MELAMINE RESINS:		
Adhesives	79,264,610	79,243,044
Textile-treating resins	33,252,372	31,718,893
Paper-treating resins	23,620,653	23,389,450
Protective coatings, modified and unmodified	24,123,565	19,196,081
Miscellaneous uses, including laminating and molding[c]	58,525,452	62,400,027
STYRENE RESINS:		
Molding materials[a]	272,216,847	248,856,462
Protective coatings, modified and unmodified	68,666,968	68,210,052
Miscellaneous uses	72,090,197	63,804,707
VINYL RESINS:[d] Total	431,057,056	408,131,792
Sheeting and film (resin content)[e]		154,901,746
Adhesives (resin content)		17,286,688
Textile and paper-treating resins (resin content)[f]		42,298,130
Molding and extrusion materials (resin content)		140,872,444
Protective coatings (resin content)		20,979,499
Miscellaneous uses (resin content)		31,793,285
COUMARONE-INDENE AND PETROLEUM POLYMER RESINS:	175,668,427	175,333,359
MISCELLANEOUS SYNTHETIC *PLASTICS AND RESIN MATERIALS:		
Molding materials[a,g]	105,195,183	99,499,219
Protective coatings[h]	21,870,377	24,528,132
All other uses[i]	107,584,277	103,279,571

* Dry basis is designated unless otherwise specified. [a] Includes fillers plasticizers, and extenders. [b] Includes sheets, rods, and tubes, and molding and extrusion materials. [c] Data on resins for laminating and miscellaneous uses are on a dry basis; data on molding materials are on the basis of total weight. [d] Production statistics by uses are not representative, as end use may not be known at the time of manufacture. Therefore, only statistics on total produc-

Plastics Materials

of the same company, and for sale. Sales include only the quantities involved in bona fide sales in which title passes to the purchaser.

POUNDS* FOR DECEMBER 1952 AND JANUARY 1953 by U. S. Tariff Commission

December 1952		*January 1953*	
Production	*Sales*	*Production*	*Sales*
1,136,543	1,186,092	1,021,932	1,216,481
1,126,690	1,067,449	825,491	781,863
395,800	427,046	512,534	350,080
5,779,979	5,344,656	5,991,958	6,222,809
463,677	451,314	553,310	507,341
92,066	79,835	56,244	76,393
456,443	541,623	532,461	618,706
6,590,860	4,533,015	7,107,340	4,815,532
3,526,824	3,469,704	4,077,163	3,734,013
17,061,377	17,809,366	17,111,429	19,264,988
2,352,941	2,429,714	2,554,777	2,174,087
7,294,892	6,550,828	7,009,342	6,663,067
8,144,941	8,423,516	5,405,080	4,727,844
2,947,762	2,839,444	2,971,322	3,207,993
2,239,202	2,644,562	2,093,750	1,973,201
2,505,704	1,921,639	2,534,063	1,919,804
7,140,720	6,549,569	7,412,641	6,541,341
29,433,004	27,328,393	25,842,559	24,445,418
6,265,806	6,765,412	6,942,728	7,003,170
7,609,671	6,188,843	7,095,157	6,409,390
41,653,642	38,093,953	44,505,893	41,990,779
	12,873,868		14,830,282
	1,586,864		1,986,772
	3,483,050		4,283,852
	14,763,506		15,423,806
	2,020,174		2,389,961
	3,366,491		3,076,106
16,104,328	14,846,934	14,378,100	14,693,761
10,949,644	10,068,590	10,729,217	9,648,320
1,676,315	2,315,880	679,542	390,569
10,975,769	10,451,607	11,058,475	11,233,916

tion are given. * Prior to January 1951, statistics were given on the basis of total weight. [f] Includes data for spreader and calendering-type resins. [g] Includes data for acrylic, polyethylene, nylon, and others. [h] Includes data for epichlorohydrin acrylic, polyester, silicone, and other protective coating resins. [i] Includes data for acrylic, rosin modifications, nylon, silicone, and other plastics and resins for miscellaneous uses.

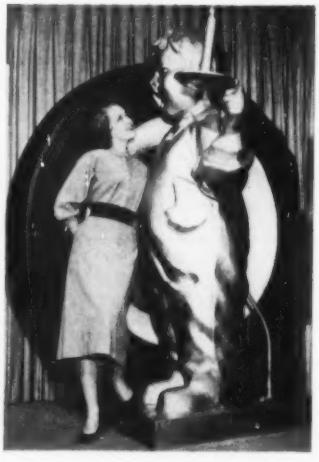
Glass-Plastic 'Fisk Boy'

A FAMOUS trademark has grown up. The well-known "Fisk Boy"—the boy with the tire over his arm, lighting his way to bed—is now being produced from reinforced plastics in 6-ft. size. These large outdoor displays are being made from Vibrin polyester resin, produced by United States Rubber Co., and fibrous glass. Molding is by Bassons Industries Corp., Bronx, N.Y., which company also impregnates the molded parts with color—the boy in gold and the tire in black and white. Each unit weighs approximately 200 lb. and the displays are electrically wired so that the candle carried by the boy may be lighted for increased attention-getting effectiveness.

The displays are to be used by Fisk tire distributors throughout the country. Because of the weather-resistance of the material, the signs can be left out-of-doors for long periods of time without need for refinishing or maintenance.

Earlier attempts at making large models of the Fisk Boy involved such materials as papier mâché and chlorinated rubber. However, until the development of the polyester fibrous glass model, none of the moldable materials tried would withstand long outdoor exposure without appreciable deterioration.

Outdoor display, 6 ft. high, is molded of resin-impregnated fibrous glass



Thermex

PLASTIC PREHEATING APPARATUS

"For 8 years...completely satisfactory"

says... AMERICAN INSULATOR CORPORATION.

C. M. Morris, Vice President and General Manager and L. T. Harrower, Sales Manager, American Insulator Corp. examine a table model radio cabinet, perfectly molded from preforms uniformly heated and cured with THERMEX Electronic Heating Apparatus.

Model 3R THERMEX Plastic Preheating Unit. This 3-KW unit can heat up to 2¼ lbs. of general purpose material from 80 degrees to 250 degrees F. in one minute.

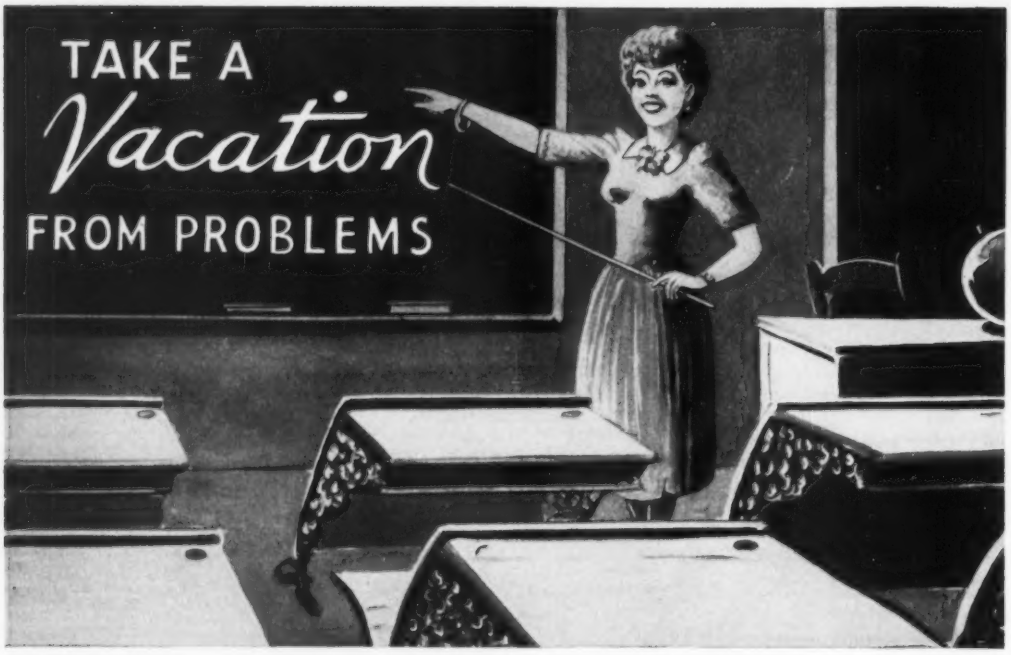
A TOTAL of 24 THERMEX* Plastic Preheating Units of 5-KW and 3-KW capacity have been installed at American Insulator Corp., New Freedom, Pa. during the past 8 years. According to Mr. S. C. McKnight, Plant Superintendent of this progressive manufacturer of plastic components, the THERMEX equipment has given highly dependable service, operating continuously with the plant schedule of 100 hours per week, 50 weeks per year. It has enabled American Insulator to get *more uniform molding results, faster production and substantial reduction in costs.*

Investigate THERMEX Preheating Apparatus for *your* plant. A THERMEX Engineer is at your service. Call or write The Girdler Corporation, Thermex Division, Louisville 1, Kentucky.

*THERMEX - Trade Mark Reg. U.S. Pat. Off.

The GIRDLER Corporation

THERMEX DIVISION



Use HARCHEM Plasticizers and have no problems because:

HARFLEX® PLASTICIZERS
ARE OUTSTANDING FOR

Low Temperature Performance

•

Weathering Stability

•

Long Range High Temperature Service

For Plasticizers of QUALITY, write

HARCHEM

41 EAST 42nd STREET, NEW YORK 17, N. Y.

THE KEY TO HARCHEM® BETTER PLASTICS

HARDESTY CHEMICAL DIVISION
W. C. HARDESTY CO., INC.

Manufacturers of Sebacic Acid

Canadian Distributor: W. C. Hardesty Co. of Canada Ltd., 975 Lakeshore Road, New Toronto, Canada

1. SELECT the items you want
2. CIRCLE the corresponding numbers on the post card
3. FILL IN the information requested
4. MAIL — no postage required

HELPFUL LITERATURE FREE

There is valuable data — worth dollars and cents to you — in the literature and samples described below.

EQUIPMENT • SUPPLIES • SERVICES

IMPREGNATED MATERIALS FOR REINFORCED MOLDING. Bulletin on "Cordopreg" dry process impregnated materials and resins for economical molding of reinforced plastics. Materials available with controlled resin content. Cordo Molding Products, Inc. **(F-301)**

PVC RESIN. Technical data on compounding and processing "Pliovic G80V," a low temperature processing polyvinyl chloride resin with exceptional stability to heat and light. Goodyear Tire & Rubber Co., Inc. **(F-302)**

ELECTRONIC CONTROLLERS. Catalog on the various strip chart controllers, circular chart controllers, circular scale controllers, and electric and pneumatic control instruments manufactured by Minneapolis-Honeywell Regulator Co. **(F-303)**

BONDING RESINS. Series of five bulletins on "Araldite" epoxy bonding resins for securing tight bonds between a wide variety of materials. Data on handling, application, storage, etc. Ciba Co., Inc. **(F-304)**

"DUPLIMATIC" INJECTION PRESS. Specification data on the 2½-ounce "Duplimatic" plastic injection molding machine for insert work, having two lower mold halves mounted on a shifting table. Moslo Machinery Co. **(F-305)**

ETHYLBENZENE. Technical data report on a highly reactive aromatic hydrocarbon which may be used for the production of styrene monomer and chlorostyrene, and as a solvent. Monsanto Chemical Co. **(F-306)**

POLYMERIZED PETROLEUM RESIN. Detailed explanation of the properties and possible uses for "Piccopale," a polymerized thermoplastic petroleum resin which can serve as an extender, reinforcement, and processing aid for polyethylene, styrene, acrylic, vinyl, and cellulosic plastics. Pennsylvania Industrial Chemical Corp. **(F-307)**

PLASKON RESIN GLUES. Technical information on Plaskon powdered and liquid resin glues for high quality gluing of plywood and furniture. Plaskon Div., Libbey-Owens-Ford Glass Co. **(F-308)**

METALLIZING OF PLASTICS. Data on a service which metallizes plastic items in silver, gold, bronze, or any specified color. Lists facilities available, production, etc. Bradford Novelty Co. **(F-309)**

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ENGRAVING MACHINES. Three "Panto" machines for two-dimensional engraving of letters and other designs on plastics are described in a pamphlet issued by H. P. Preis Engraving Machine Co. **(F-313)**

DECORATIVE METALLIZED FILMS. Samples of plain, embossed, and printed acetate film metallized in gold, silver, and other colors for decorative applications. Metal Film Co. **(F-314)**

ALIPHATIC NITROGEN COMPOUNDS. Booklet describes 35 aliphatic nitrogen compounds. Lists physical properties, specifications, and test methods. Carbide & Carbon Chemicals Co., Div. Union Carbide & Carbon Corp. **(F-315)**

"FLEXI-SPEED DRIVE." Information on Reeves variable speed drives for running a wide range of machinery is contained in a bulletin issued by Reeves Pulley Co. **(F-316)**

"INSULCOLOR." Data on a new plastic coating for color identification and insulation of pipes which conduct heated or cooled mediums. Armstrong Cork Co. **(F-317)**

VINYL STABILIZERS. Series of five data sheets cover the physical properties of Harshaw-V-Stabilizers for increasing the heat and light stability of polyvinyl chloride, plastisols, and other vinyl copolymers. The Harshaw Chemical Co. **(F-318)**

PERFORATING OF PLASTICS. Folder contains sample swatches of films, rigid sheets, and coated plastics perforated with various sizes and spacings of holes for ventilation, air escape, light transmission, and decorative applications. The Harrington & King Perforating Co. **(F-319)**

HYDRAULIC PUMPS AND CONTROLS. Data on various Vickers pressure, volume, and directional controls, hydraulic motors, transmissions, and cylinders. Specifications included. Vickers, Inc. **(F-320)**

FORMICA FOR BEARING SURFACE APPLICATIONS. The use of Formica End Grain Grade C for bearing surface applications in the manufacture of heavy machine tools is explained in a bulletin issued by The Formica Co. **(F-321)**

POLYESTER RESINS. Publication discusses the catalysts, fillers, and pigments used with polyester resins and describes the principal fabricating methods. Lists suppliers of glass, fillers, etc., required for production of reinforced plastics. General Electric Co. **(F-322)**

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GRANULATING MACHINES. Folder explains the features, operations and advantages of Leominster granulating machines for reducing sprues, runners, and other scrap to uniform size. Leominster Tool Co., Inc. **(F-332)**

TEMPERATURES FOR POST-FORMING LAMINATES. Information on how "Tempilstik" temperature indicating crayons can be used to determine whether post-formable laminates have reached proper working temperatures. Tempil Corp. **(F-333)**

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HYDRAULIC ACCUMULATORS. Information on the need for, the development of, and the application of hydraulic accumulators to a large range of industrial problems. Greer Hydraulics, Inc. **(F-335)**

JIG BORER. Specification and operational data on the Pratt & Whitney "2E Electrolomit" jig borer for handling small to medium-sized jobs. Pratt & Whitney. **(F-336)**

REINFORCED PLASTICS. Data on the fibrous glass reinforced plastics molding development service available at the Ferro Corp. **(F-337)**

STABILIZERS AND LUBRICANTS FOR PVC. Reference sheet with general information on Witco heat and light stabilizers and lubricants for use in polyvinyl chloride formulations. Witco Chemical Co. **(F-338)**

"PACK TO ATTRACT." Portfolio of ideas for successfully packaging a vast assortment of manufactured goods in corrugated display and shipping containers. Hinde & Dauch Paper Co. **(F-339)**

POLYESTER RESINS. Booklet outlines the properties, formulation, compounding, reinforcement, and molding of Bakelite polyester resins by diaphragm, rubber plug, and matched metal die molding. Bakelite Co., Div. Union Carbide & Carbon Corp. **(F-340)**

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DIE CUTTING PRESS. Bulletin and specification sheet on the "Tri-Power" heavy duty die cutting press made by Hobbs Mfg. Co. **(F-343)**

STABILIZER FOR VINYL. Bulletin on "Barca 10," a new liquid stabilizer for vinyl resins which combines barium and cadmium and is characterized by excellent heat and light resistance and outstanding performance in plastisols. Deecy Products Co. **(F-344)**

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Molded phenolic body and hinged cover of daylight developing tank for movie film of all sizes are unaffected by processing solutions; the cover has a lightproof filling funnel

Phenolic Film Developing Tank

THE chemical resistance and dimensional stability of molded phenolic plastics are used to advantage as the body and cover of a G-3 daylight film developing tank made by The Morse Instrument Co., Hudson, Ohio. Measuring 12 in. long, 6¾ in. wide, and 4½ in. high, the tank has a capacity of 3 pints and is used in processing 8-, 16-, or 35-mm. movie films for the negative or reversal process. Stainless steel reels which fit into the tank accommodate up to 100 ft. of film. Size changes for the three different types of film are made by a simple twist of the top flange of the reel.

By means of this compact tank, which is immune to the acids used in the developing process, movie enthusiasts can now process their own film in twelve simple steps, ready to dry and project only a few hours after they are taken. The two main plastic parts include the tank proper and the removable cover, designed with mating tongue and groove edges for a tight fit. Processing solutions and water are introduced via a lightproof funnel opening in the cover, while a drain at the bottom of the tank permits liquids to be drawn off after use. Once the exposed film has been placed in the tank and the cover secured, all operations may be safely and quickly performed in full daylight. Secondary exposure is made through a water-tight glass viewing window in the front of the tank.

The acid-proof cover and tank, which stands on integral legs, are made by The Vlchek Tool Co., Cleveland, Ohio, using black Durite phenolic material. Both parts are produced in single cavity molds without preforming, on presses ranging from 150- to 250-ton capacity. Small additional components, known as light traps, are molded in a two-cavity die. The only finishing required consists of edge flashing the tank and cover before packaging.

Interior of phenolic tank. Adjustable reels accommodate up to 100 ft. of film

Attractively colored extruded vinyl boat bumpers will not rot, abrade, or soil

Boat Bumpers

VINYL bumpers for sailing boats, outboards, and dinghys afford excellent protection against damaging bumps and minor collisions that have long been the bane of boating enthusiasts.

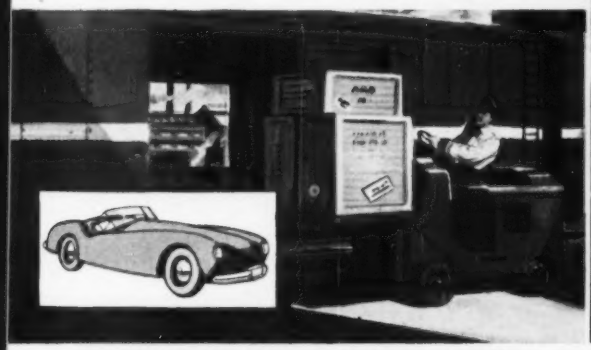
The bumpers are extruded of Geon vinyl, a product of B. F. Goodrich Chemical Co., by Rex Corp., Cambridge, Mass., and are being used as standard equipment and standard extras on the sailing craft manufactured by Cape Cod Shipbuilding Co., Wareham, Mass.

Characterized by toughness, attractive coloring, and resistance to aging, the new bumpers are expected to replace many of the types which are currently popular—cotton rope, canvas covered sponge rubber, and synthetic rubber. In contrast to the several disadvantages inherent in all three, the solid vinyl bumper will not abrade, rot, soil, or be weakened by exposure to all types of weather.

Once installed, the bumper remains permanently in place. Heat, cold, salt water, and the direct rays of the sun have little effect on it. Vinyl bumpers can be kept spotlessly clean by wiping with a damp cloth.

Sail boats trimmed with the bumpers have been in use for the past several months in the rugged training program of the U. S. Coast Guard. Despite innumerable scrapes and several collisions caused by the inexperienced cadets, neither the boats nor the bumpers involved in the accidents were damaged.

WHY NOT...



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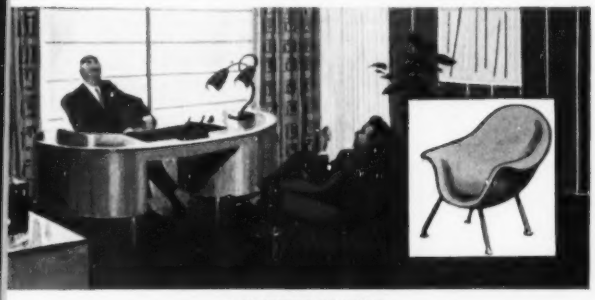

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Canadian S.P.I.

AT THE 11th Annual Conference of The Society of the Plastics Industry (Canada) Inc., in March, G. Murry Scott, Dow Chemical Co., Canada, was elected president for the ensuing year. Vice president is A. E. Byrne, Canadian General Electric Co. Ltd.; treasurer is R. T. Todd, Irvington Varnish & Insulator Co., Ltd., Hamilton, Ont.; and councilor at large is F. G. Rice.

Speaker at the annual dinner was Dr. Frank K. Schoenfeld, vice president of B. F. Goodrich Chemical Co., Cleveland, Ohio, who discussed the current industrial revolution and expansion in Canada.

Canadians, he noted, are on the whole rather conservative in accepting new products and in reacting to merchandising and promotional effort. Therefore it behooves the plastics industry in Canada to maintain high performance quality and plan intelligent and powerful merchandising. Since plastics are the most versatile structural materials known, and since Canada's vast expansion requires structural materials in huge quantities, Dominion markets will be good for many years to come.

A luncheon session featured Gordon Brown, president of S.P.I. and W. T. Cruse, executive vice president of S.P.I., in a dramatic report on what S.P.I. has done and is doing in both Canada and the United States.

A forum on plastics in packaging was headed by A. L. Rowe, Rowe Packaging Co. Ltd., Toronto. Other members of the committee were J. A. McAvity, Plastics Coating Div., E. S. & A. Robinson (Canada) Ltd.; and D. M. Taylor, *Canadian Plastics* magazine.

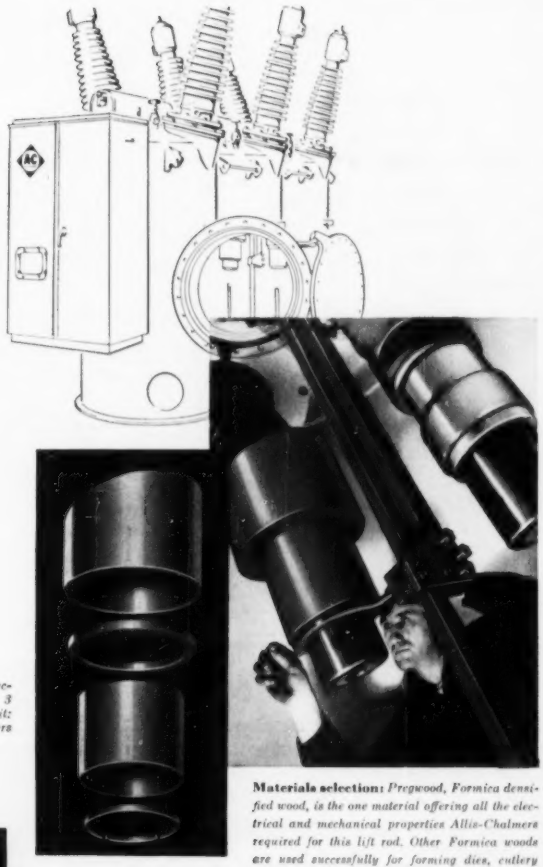
Another forum discussion treated with government requirements of plastics. It was led by J. A. Hanna, Canadian Government Specification Board; and Glen Gay, Defense Research Board.

Other speakers and their subjects were R. W. Powell, Plastics Machinery Div., The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, "Pre-plasticizers"; Dr. Earle S. Ebers, Naugatuck Chemicals, Naugatuck, Conn., "Reinforced Plastics"; and William T. Reedy, Rohm & Haas Co., Philadelphia, Pa., "Acrylic Plastics Developments."

DESIGN ENGINEERING PROBLEMS

Problems*	Formica helps with these
cost reduction	X
improved appearance	X
production methods	X
automatic operation	
decreased maintenance	X
weight reduction	X
greater precision	X
materials selection	X
higher speeds	
quieter operation	X
easier operating controls	
lubricating methods	X
reduced vibration	X

*in order of current importance as established by MACHINE DESIGN† survey



Production methods: *Formica provides electrical insulation in the right shape . . . with 3 tubes and a molded ring assembled into one unit: an electrostatic shield for the Allis-Chalmers BZO-160 oil circuit breaker.*

Materials selection: *Pregwood, Formica densified wood, is the one material offering all the electrical and mechanical properties Allis-Chalmers required for this lift rod. Other Formica woods are used successfully for forming dies, cutlery handles, brush backs and musical instruments.*

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When 90,000† design engineers recently named their toughest problems, we checked the list . . . and found that Formica's versatile grades scored 10 hits out of a possible 13!

In one specific case—the Allis-Chalmers oil circuit breaker shown above—Formica laminated plastics helped lick as many as 5 difficult design problems: cost reduction, production methods, decreased maintenance, weight reduction and materials selection.

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Inflated Torso

AN INFLATED torso for displaying bathing suits or foundation garments is designed to meet the practicality, economy, and high fashion requirements of the modern retailing establishment.

Fabricated of polyvinyl chloride sheeting by W. L. Stensgaard and Associates, Inc., Chicago, Ill., the torso is supplied with a tuck-in type of valve in back that permits easy inflation by mouth. When fully blown up, the rounded, translucent form lends itself to many dramatic lighting and display possibilities. The flexible vinyl completely fills the garment being displayed and offers a truly natural, life-like appearance.

Inflatable torso model for displaying bathing suits is fabricated of vinyl

The torso is lightweight, easy to clean, and will hold its size and shape over long periods of time. Unlike the bulky plaster dummy which was easily chipped, it resists damage from abrasion, scuffing, or falling. When deflated, the torso can be stored in a few inches of space.

The torsos are offered in a variety of flounce trims, either plastic or lace. The plastic flounces, with patterns and designs silk screened or stenciled on, are especially adaptable to the display of swim suits; the lace net in white and pastel shades adorned with small cloth flowers, are equally suitable for both foundation garments and bathing attire.

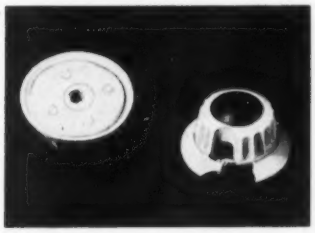
Safety Knob

RUGGED safety knob, designed to eliminate the dangers of accidentally turned-on gas or electricity, is molded of white urea.

Unless carefully pushed in before turning, the knob, which is manufactured by Patent Button Co. of Tenn., Inc., Knoxville, Tenn., will twirl harmlessly in place without activating the appliance to which it is attached.

The knob is molded of Plaskon urea in two parts. The front half, which is grooved for easier gripping, and the back half, which connects directly to the shank of the appliance valve or switch, both have a series of small serrations molded around the circumference of their bottom surfaces.

In normal position, the two sets of serrations are separated, so that the front half will spin freely and



Back half (left) of urea knob cannot turn unless serrations (cut-away, right) mesh

independently of the back half. When the front is pushed in, however, the serrations on top and bottom mesh and the back half can be turned to start and regulate the flow of gas or electricity. The knob springs back to the 'free twirling' position upon release.

With the exception of a metal face and spring, the entire knob is molded of urea. It is non-burning, non-electrostatic, and will resist heat or scratching. A damp cloth will wipe the knob clean of the food stuffs or grease which tend to accumulate on the parts of kitchen appliances.

The knobs have already been installed on new model gas stoves and are currently being tested for air-conditioning units, electrical ranges, heaters, radio and TV sets, and oil burners.

Polyethylene

(*Continued from pp. 79-85*)

post-war period. This new workhorse of the packaging field brought a new conception of convenience to the packaging of hundreds of products from anti-perspirants to window cleaners. Beginning in 1947 with the Stopette bottle, developed by Dr. Jules Montenier of Chicago, in cooperation with Plax Corp., Hartford, Conn., the flexible bottle has mushroomed into an important position in the packaging field. It is estimated that around 75 million squeeze bottles are being made annually, with some 2000 products thus packaged.

Like Dr. Montenier, hundreds of others have found polyethylene containers suited to their products, not only because of their light weight, non-breakability, and self-dispensing features, but also because of their excellent chemical resistance. In the bulk shipment of such products as hydrofluoric acid, which attacks glass, polyethylene containers of larger size do an excellent job. Such industrial applications generally involve no self-dispensing function, but are based entirely on chemical resistance, light weight, and durability.

Some of the polyethylene carboys now made by Plax Corp.,[2] will hold as much as 14 gallons. They are particularly useful for packaging such products as industrial acids, caustic soda solution, hydrogen peroxide, liquid pharmaceuticals, photographic chemical solutions, and many other liquids. The unbreakable carboy has successfully passed tests necessary for Bureau of Explosives recommendation for ICC approval for shipment of hydrofluoric acid and electrolyte sulfuric acid. In actual tests, these containers have proved their ability to withstand the impact of a truck smashing into them at 50 m.p.h. and the weight of a 10-ton bulldozer.

Another type of heavy-duty carboy made possible by polyethylene is the Karbox shipping container[3] used by Tennessee Products and Chemical Corp., New York, N.Y., for muriatic acid and other "problem" chemicals. Of 15-gal. capacity, this

[2] See "Production of Large Polyethylene Carboys," MODERN PLASTICS, July 1952, p. 101, ff.
[3] See "Acids in a Box," MODERN PLASTICS, January 1953, p. 151.

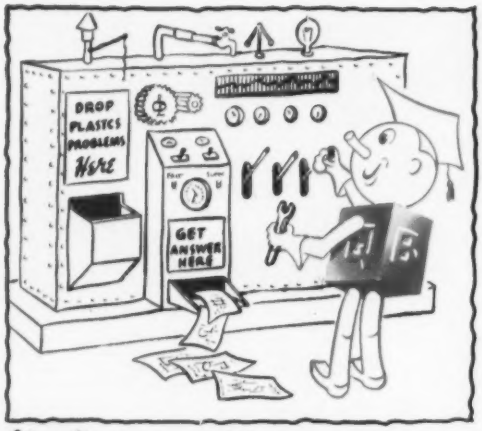
carboy consists of a polyethylene container in a wooden shipping box. The carboy is molded in two half sections which are assembled by heat sealing the flanged edges and reinforcing with a steel strip. The container is equipped with a detachable pouring spout which is reversed inside the container during shipment. The large polyethylene sections for the Karbox are molded by A. L. Hyde Co., Grenloch, N.J.

Limited only by Imagination

Although they originally appeared in simple shapes such as the familiar Boston round style, blow-molded polyethylene bottles are now available in a diversity of shapes limited only by the imagination of the designer. One indication of how consumer convenience features can be built into a polyethylene bottle is the new container for Noreen Super Satin Creme Shampoo. Shaped like a streamlined teardrop, the 4-oz. package, made by Imco Container Corp., Kansas City, Mo., has a conical captive dispensing closure and is molded with a loop which fits over a wall hook that fastens to any smooth surface, immediately convenient to tub or lavatory. Imco also produces a molded polyethylene jar in various sizes and color combinations, said to be the only such container with double wall construction.

Blown polyethylene bottles of stock or custom design are widely used as dispensers for various types of products. Celebrity, Inc., New York, N.Y., for example, has introduced a custom molded line of polyethylene atomizers and dispensers made by Plax Corp., which includes a clown, a bunny, and two high-style atomizers and dispensers under the name of Petal Puff.

Anro Products Co., Inc., Chicago, Ill., utilizes the self-dispensing features of a polyethylene bottle in an effective yet economical dishwasher which saves the housewife's time and keeps her hands out of the dish water. It consists of a stock bottle by Elmer E. Mills Corp., Chicago, fitted with a rubber spray head in which nylon bristles are mounted. Squeezing the bottle sprays liquid detergent directly on the dishes, and the brush supplies the necessary scrubbing action. The Mills organization also produces a new type of squeezable polyethylene tube which is used by Sue-Ann Food Products



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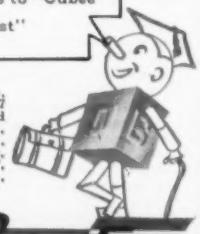

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Co., Chicago, for cocktail cheese spreads and by its Ries Finer Food Div., for sardine spread.

Squeezit Corp., Morris Heights, N.Y., has built an enterprising business on squeezable polyethylene dispensers of novel design and application. Perhaps the most familiar of these items is the catsup dispenser, faithfully duplicating the appearance of a luscious red tomato and holding a full bottle of catsup. A similar dispenser, appropriately molded in a color to match the product, is used for mustard. Others include the Honey Bear chocolate syrup dispenser, the Squeeze-A-Jigger flask, which measures out one ounce of liquid, and the new One Stroke Window Cleaner, which has a rubber squeegee mounted directly on the spray head and can be refilled with any liquid detergent.

Molded polyethylene closures are now widely used on many products in glass bottles and other types of containers. They are non-breakable, seal tightly, resistant to most products, and need no supplementary liner.

Molded polyethylene spouts for oil cans are now widely used because of their flexibility, translucence, and safety features. Beemak Plastics, Los Angeles, Calif., has gone a step further with its Beemak Oiler, a ⅓-pint oil can completely molded of polyethylene in two parts—base and removable spout. Among the features of the oiler are easier filling, controlled pressure, and the safety and convenience of the spout, which bends around corners to reach inaccessible places.

Boxes

Self-hinged boxes, with body and cover molded in a single shot, are another type of package made possible through the flexibility of polyethylene. A number of such boxes are now in use for products ranging from first aid supplies to tools and sewing machine attachments. One of the first such boxes was a container for Singer attachments,[4] molded by Auburn Button Works, Inc., Auburn, N.Y. It was so designed that a thin web of plastic material connects the body and cover, eliminating the need for an extra hinge and fasteners.

A somewhat similar compartmented box, in translucent white polyethylene, has been used by

[4]See "Self-Hinged Polyethylene Box," MODERN PLASTICS, May 1949, p. 73.

Johnson & Johnson for a De Luxe First Aid Kit which will not rust or corrode and does not rattle in the glove compartment of a car. Boxes of this "siamese" construction are especially useful for tools and other items which are inclined to rattle in metal or which might become dulled or damaged through contact with hard surfaces.

Syringes

Closely related to the packaging field are the disposable syringes and similar devices now coming into wide usage in the dispensing of parenterals and antibiotics. In the drug industry, such injectables are now reported to account for an annual sales volume of approximately $200 million. If the present trend continues, they may become one of the largest volume items in drug manufacturing. Their growing popularity is based on the fact that they do away with the time-consuming job of reconstituting concentrated or powder form drugs, measuring accurate dosage, and sterilizing and assembly of the old type hypodermic.

Prior to 1951, the only permissible containers for injectables were glass. In that year, after submission of exhaustive clinical evaluation studies and field trial reports to the Federal Food & Drug Administration, the rules were modified to permit use of specified polyethylene containers for this purpose. Present indications are that a majority of the presently known injectables will be compatible in polyethylene.

One such item, which is basically a miniature squeeze-type container equipped with a sterile needle, is used by Abbott Laboratories for its Procaine, employed as a local anesthetic. Abbott's new Abboject syringe for intramuscular use is a disposal 1-cc. syringe of molded polyethylene construction. To use this syringe, the plastic cap is first removed from the tip and a needle twisted on tightly. The injection is made simply by grasping the syringe in one hand and pressing the polyethylene plunger. Extremely critical dimensional specifications must be met in the molding of parts for this device, which are made by Continental Plastics, Chicago, Ill.

TOYS

Although present polyethylene applications in the toy field are re-

latively few, there is good reason to believe that the material will eventually find wide volume usage for toys and novelties. All its properties are in its favor. It can, for example, be used with perfect safety for such infant items as teething rings, drinking cups, rattles, play-pen toys, and other objects which may be placed directly in the mouth. Another advantage is the fact that even if a child should fall upon or be struck by a polyethylene toy, no injuries are likely to result.

Among the earliest polyethylene toys placed on the market was a set of nesting blocks produced by Gerber Plastic Co., St. Louis, Mo. Molded in attractive colors, the blocks have letters of the alphabet and animal figures screened on the side. Since each block is hollow, they may be nested to take up very little space. And since polyethylene floats, the blocks can be used as a bathtub toy even though no trapped air space is present.

Another molded polyethylene item which takes advantage of the flotation properties of polyethylene is a juvenile hand brush with nylon bristles, designed to simulate the appearance of a boat, complete with funnels and superstructure. This item has proved very popular with both parents and children, combining play appeal with a practical purpose. It is molded in vivid red, blue, and yellow polyethylene by Autograph Brush & Plastics Co., Inc., Watervliet, N.Y.

Toy soldiers and military equipment, molded of polyethylene by Werner Mfg. Co., Lyons, Ill., combine realistic appearance, light weight, and safety, and are virtually unbreakable. In this respect they are a far cry from the early toy soldiers of lead and other metals, which could inflict painful injuries and cause considerable damage to walls or furniture if thrown or raked across finished surfaces.

Rocket Pencil

The resilience of polyethylene has been put to effective use in an unusual juvenile pencil known as the S-4 Space Bomb, made by Royal Tot Mfg. Co., Brooklyn, N.Y. Shaped like a rocket, with thin tail fins and a bulbous nose, the pencil has an over-all length of 3½ in. and is molded in two parts, the nose forming a removable cap. It comes

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VINYLITE Plastic Rigid Sheet has opened up to creative thinking a great new source of ideas and applications for virtually all products and services.

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Versatile VINYLITE Plastic Rigid Sheet makes a distinctive display package for Charbert men's toiletries. The colorful, transparent globe smartly highlights the theme, "It's a man's world." Other uses for VINYLITE Plastic Rigid Sheet include light-diffusing ceilings; uniform, dimensionally stable drafting instruments; sturdy, easily cleaned, 3-dimensional signs, printed then formed, and doll faces colored after forming.

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Portion Control Packs by Kraft Foods Company, Chicago 90, Illinois. Package for Charbert, Inc., by Mechtronics Corp., Mamaroneck, N.Y.

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equipped with a single thick stick of lead. The nose of the pencil is molded with an opening through which the lead is inserted. The resilient polyethylene holds the lead securely enough for writing, yet the cap may be unscrewed and the lead pushed further out whenever that becomes necessary.

Also in the juvenile military category is a new polyethylene water pistol refill container which reduces trips to the faucet. Rocket-like in shape, it is molded in two parts and has an integral clip which snaps on the belt for convenient carrying. Captive plugs at each end of the device facilitate filling and transfer of water to the pistol.

Another rocket-shaped toy which has been on the market for some time is a type of aerial bomb which is loaded with a cap and thrown into the air. This item is designed with a captive metal nose which punctures and explodes the cap as it strikes the ground. One firm making this type of toy is Tybond Products Co., Chicago, Ill. Polyethylene works well for this application because it is able to withstand the repeated explosions and contacts with the ground without danger of breaking.

Somewhat more conventional is the attractive polyethylene sand bucket molded by Irwin Corp., Fitchburg, Mass. Designed with a snap-on type semi-circular handle which fits into slots at the edge of the rim, the bucket carries a beach scene molded in relief on the side. It will not crack or rust, has no sharp edges, and is unbreakable. It comes equipped with a molded styrene shovel.

SPORTING GOODS

Sporting goods offer another relatively unexploited market for molded polyethylene. One example of the possibilities in this field is a new "paintless cover" golf ball made by Metropolitan Golf Ball Co., Santa Monica, Calif., and designed for driving ranges. The polyethylene requires no paint or other type of coating and will remain permanently white. The material is also sufficiently resilient to withstand the repeated impacts of golf clubs at driving ranges.

Ski pole grips and rings of molded polyethylene are being made by

Repco Panels

are made to withstand a HURRICANE!

Can you think of a more rigid test to evaluate their durability? In the heart of the hurricane belt, at the University of Miami, these panels in the 1/16" thickness passed the hurricane test without damage. Conditions that prevail during the worst storms were simulated . . . winds and gusts ranging up to 135 miles per hour . . . coconuts, shingle and barrel roofing tile were induced into the air stream as well as water equal to one month's average rainfall. This was the result, briefly, in the words of Dr. H.H. Sheldon who directed the tests:

"At the conclusion of the tests the panels were carefully examined and found to be in excellent condition."

Uses: PROTECTIVE STORM WINDOWS • PERMANENT AWNINGS, SKYLIGHTS AND GREENHOUSES • colorful PARTITIONS AND COVERINGS FOR PATIOS AND BREEZEWAYS • WINDBREAKS • REPLACEMENT FOR WINDOW GLASS in factories, stores, offices and homes to eliminate glare, permitting soft light to enter • INTERIOR DECORATIONS • OUTDOOR LIGHTED DISPLAY SIGNS • for diffused lighting effects and hundreds of other uses.

in 4 types		in 6 thicknesses	in 10 colors
Type 7 TRANSLUCENT	Good light transmission	1/32", 1/16", 3/32", 1/8"	Sea Green, Coral Red, Sky Blue, Lemon Yellow, Wheat (clear)
Type 7A HIGH GLOSS TRANSLUCENT	Excellent light transmission	3/64", 3/32", 1/8"	Sea Green, Coral Red, Sky Blue, Lemon Yellow, White (clear)
Type S SEMI-OPAQUE	Glass fibers evident in surface	1/64", 1/32", 1/16", 3/32", 1/8"	Coral Red, Turquoise Blue, Lemon Yellow, Chalk White, French Gray, Mahogany Brown
Type 8 OPAQUE	Fillers added. Few surface fibers show		

Available in standard 36" x 96" or 48" x 96" sheets, Repco Panels may be trimmed into any size or cut into any shape to serve both functional and decorative purposes. Extremely light (the 48" x 96" panel in 1/16" thickness weighs only 16 lbs.), these panels are highly resistant to rust, rot, rodents, termites and weather . . . unaffected by extremes of heat, cold or moisture.

Write for folder and prices. Sample sent on request if you specify type.

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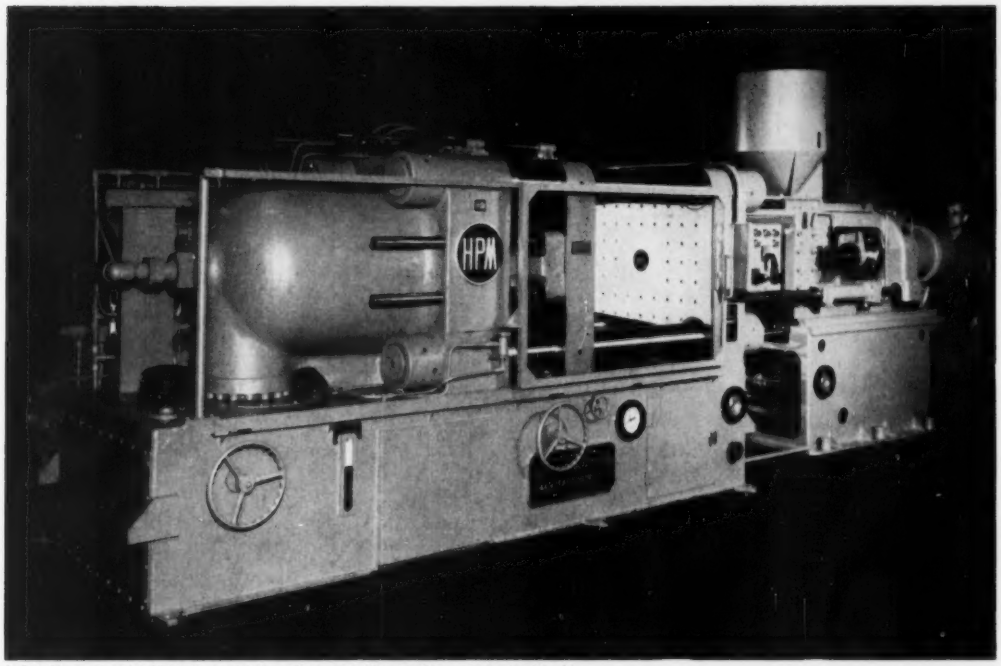
Mack Molding Co., Arlington, Vt., for Dartmouth Skis, Inc., Hanover, N.H. The equipment is for use by Marine Corps personnel. Anderson & Thompson Ski Co., Seattle, Wash., recently introduced a new ski goggle with interchangeable lenses for different light conditions. The frame of the goggle is molded in one piece of polyethylene by Plastal Specialty Co., Seattle. According to Henry Arshon, general manager of Anderson & Thompson, polyethylene was specified for this application because it is a soft material and will not become brittle at freezing temperatures. The frame is molded with perforations at the side which prevent lens clouding and slots into which the lenses may be slid. The interchangeable lenses are fabricated from Du Pont Plasticele sheeting. They are held in place at the top of the goggle by small molded studs in the frame which insert through openings at the edge of the lens.

Camera lens shields, such as the type used on the Kodak Duoflex camera, work out well in polyethylene because the material is sufficiently flexible to guard the lens against sharp impacts and can be molded with a simulated leather surface to match other parts of the camera.

Mercury Plastics Co., Van Dyke, Mich., has just come out with a new type of fish scaler to which molded polyethylene adds a functional advantage. Called the Scale-Catcher, this device includes a polyethylene cup which fits over the cadmium-plated teeth of the scaler, preventing scales from flying in all directions during the scaling operation. Rugged and odor-resistant, the scale-catching cup is easy to clean. The shield also covers the blades when the device is not in use and minimizes the chance of injuries in handling the unit and carrying it about.

Such personal products as cigarette package containers, change carriers on a key ring, shower slippers, key cases, shoe counters, and shampoo brushes molded with integral flexible bristles only hint at the dozens of additional items now being molded of polyethylene. Just how far the list will extend when molders can get all the polyethylene they want is a question that indeed challenges the imagination.—END



H-P-M 32 oz. capacity All-Hydraulic Plastics Injection Molding Machine manufactured by The Hydraulic Press Manufacturing Company, Mount Gilead, Ohio.

MARVEL *Synclinal* FILTERS

. . . used by The Hydraulic Press Manufacturing Co. in their plastics injection molding machines and die casting machines.

Just a glance at the Plastics Injection Molding Machine shows it has been built to stand rugged wear. Naturally a machine of such vital use in the plastics industry was planned by the manufacturer to give long years of service. And just as naturally, the manufacturer included in these plans the durable protection of MARVEL Synclinal FILTERS, for its hydraulic system.

MARVEL Synclinal FILTERS have proved their superiority where dependable protection is a prime consideration. They meet all requirements that call for heavy duty and still maintain peak performance.

MARVEL Synclinal DESIGN MEANS LESS FLOW RESTRICTION—PEAK PERFORMANCE

Line Type (cutaway)

You get maximum active filtering area in a mimimum of space because of the unique Synclinal design. This is the reason why OVER 350 ORIGINAL EQUIPMENT MANUFACTURERS specify and buy MARVEL Synclinal FILTERS. Filter maintenance "down-time" is reduced to an absolute minimum because MARVEL Synclinal FILTERS may be disassembled, cleaned and reassembled in a matter of minutes.

MARVEL FILTERS are available in sump and line type models, in capacities from 5 to 100 g.p.m. and in monel mesh sizes from 30 to 200. Line types operate in any position and may be serviced without disturbing pipe connections. Marvel Engineers are always available to give the facts and help solve your filtration problems.

WATER FILTERS—Both our sump and line type models are now designed for use in all water filtering applications.

Sump Type (cutaway)

Write for Complete Engineering Data —Specify Oil or Water

MARVEL *Engineering Company*

Meets J.I.C. Standards

625A-F3 WEST JACKSON BLVD., CHICAGO 6, ILLINOIS

Dictating System

(*Continued from p. 91*)

whether or not the machine is in operation at the moment.

The magazine cover is molded with a shallow depression in the top into which a card containing any written information on the dictation may be inserted. Small openings at each side of this area have clear cellulose acetate windows cemented in position on the underside of the cover, so that the rotation of the tape reels may be observed easily without the necessity of removing the cover.

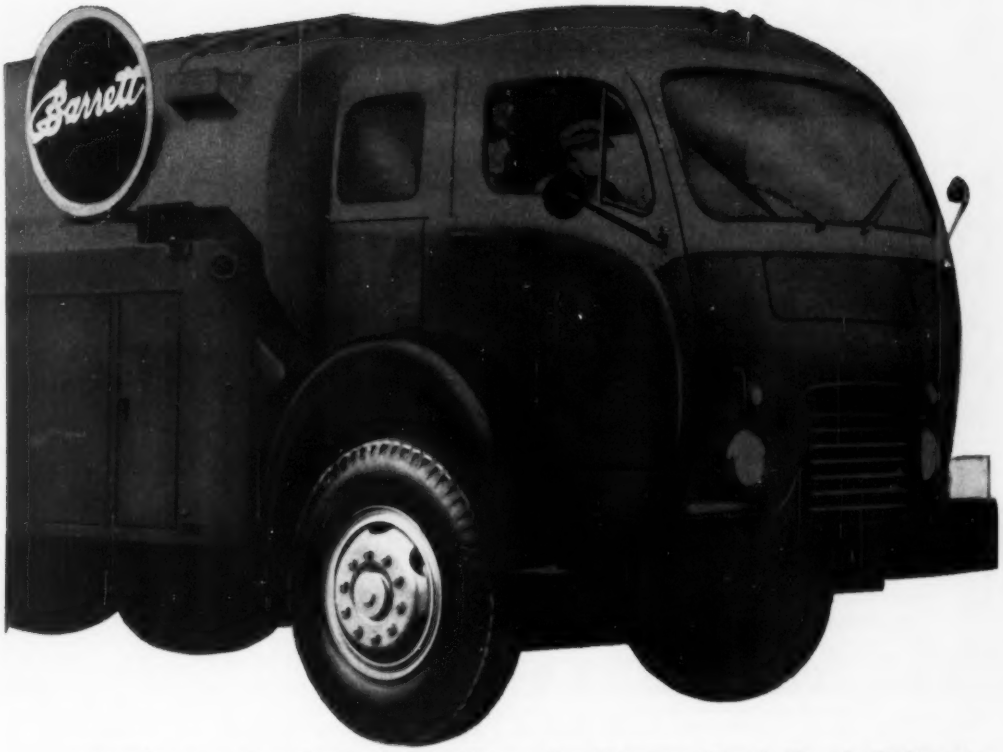
The molded cover, which is ribbed and filleted on the back for increased strength and rigidity, snaps firmly in place into the metal base of the magazine. A metal pin engages a latch in the base to provide a secure closure.

In normal use, after dictation is completed, the entire tape magazine is lifted off the machine and turned over to the stenographer who transcribes the work on a duplicate instrument. Another tape magazine is then placed in position and further dictation can be handled without interruption. One magazine loading of magnetic tape is sufficient to accommodate 30 min. of dictation.

Circular Dial

The circular dial, measuring about 3 in. in diameter, revolves slowly as the machine is operated and indexes the dictations so that individual letters may be easily located.

The dial, which is molded in a single-cavity die on a 4-oz. machine, has a beveled face carrying calibration marks and numbers from 1 to 30, to mark the passage of time as dictation is recorded on the tape. The legends, which are molded-into the outer surface of the dial, are wiped in for increased legibility. The top of the dial has a short, projecting stub which locates the printed index cards that mark the beginning of each new letter or memorandum. A metal key with a small pin beneath it is pressed down at the end of each letter making a perforation in the index card. Since markings on the card match those of the dial, it is a simple matter to locate the position of any desired letter without delay.—END



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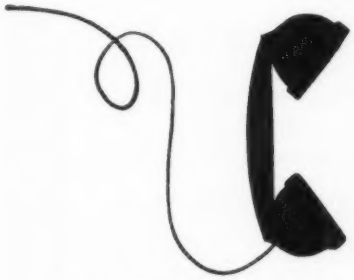

Fast, dependable deliveries of Dibutyl Phthalate and "ELASTEX" 28-P (DOP) Plasticizers *when you need them.* Phone requirements to the Barrett office nearest you. Immaculate, stainless steel trucks are your assurance of receiving clean, uncontaminated products. See telephone listing below.

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"ELASTEX" 50-B* Plasticizer

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*Reg. U. S. Pat. Off.

Tapes

(*Continued from pp.* 100-103)

cial meaning. Already the tapes have been successfully used to replace steel straps in the heavy banding of cartons and in bundling rods, tubes, and wires that might be crushed by steel strapping. The reinforced tapes are much easier to handle than straps and therefore are a factor in lowering production costs.

In the development of new applications, the tapes have also displayed versatility. One unique development by Minnesota Mining & Mfg. Co. utilizes tape for conveniently opening cardboard cartons. The reinforced tape is applied completely around the inside periphery of the carton at any desired location between the top and bottom edges, leaving only a small tab visible at one corner. When the carton is ready for unpacking, the tab is pulled back and, in much the same manner as a pack of cigarettes is opened, the tape tears through the carton and cuts the entire top cleanly off. The exceptional strength of the reinforced tape permits the carton to be torn without the need of preapplied scoring, die-cutting, or perforations.

Future

To the pressure-sensitive tape industry, the use of plastics treatments has meant new stimulation in the use of paper or cloth tapes. More important, plastics—whether as a coating or in the reinforcing of the tapes—have been instrumental in making industrial and consumer users more aware of tape as an aid in industrial operations as well as a highly useful implement in everyday living.

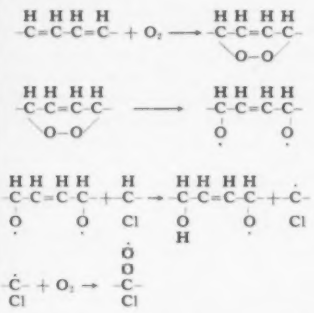
The emphasis of government specifications on plastics coating for packaging tapes has been transferred to industrial packaging uses; the consumer-appealing qualities of plastics-coated household tape are finding eager acceptance by the public; and the outstanding properties of the reinforced tapes have dramatized an all-around versatility not found in earlier products.

Pressure-sensitive tape has found a successful partner in plastics. The future holds many promises for the combination.—END

Heat and Light

(*Continued from pp. 123-128*)

in turn would produce a more labile chlorine atom:



This is but one of many similar mechanisms that could be written to support the experimental evidence. This situation is closely related to the oxidation of unsaturated fats, particularly those with conjugated double bonds. Most of these mechanisms would account for the presence of carbonyl groups in degraded polyvinyl chloride, the presence of which has been reported previously (5).

The activating effect of hydrogen chloride upon the decomposition rate in the presence of oxygen finds a corollary in recent work of Raley, Rust, and Vaughn (6). These authors report sensitization of the vapor phase decomposition of di-tert-butyl and di-tert-amyl peroxides by hydrogen chloride. They propose the following mechanism:

$$R_3COOCR_3 \longrightarrow 2\,R_3CO^{\cdot}$$
$$R_3CO^{\cdot} + HCl \rightarrow R_3COH + Cl^{\cdot}$$
$$R_3CO^{\cdot} \longrightarrow R_2C{=}O + R^{\cdot}$$
$$R^{\cdot} + HCl \longrightarrow RH + Cl^{\cdot}$$

It is reasonable to assume a similar mechanism taking place during the decomposition of polyvinyl chloride in the presence of air. The increase in the rate of production of free radicals by the action of hydrogen chloride would readily account for an increase in the development of points of lower activation energy in dehydrochlorination reactions.

Action of Stabilizers

Stabilizers can be tested properly only in plasticized stocks. This produces a condition that is different from tests on granular polymer. In the first place the polymer molecules are solvated by the plasticizer and secondly, the polymer has undergone an exposure to heat and oxygen in the milling process. In any event different results were obtained between stocks which only had been milled and those which had been molded for 3 min. at 340° F. after incorporation of plasticizer and stabilizer by milling. Reproducibility was not too good but the differences that were observed were with respect to time rather than the slopes of the curves. Figures 12 and 13 present results obtained on molded plasticized stocks with and

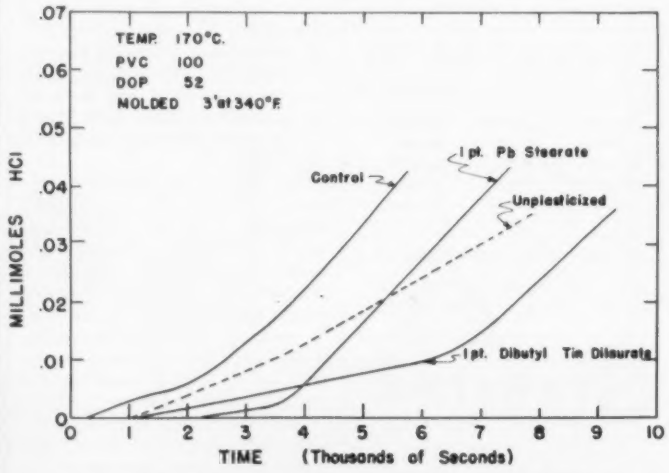


Fig. 12—Thermal decomposition of plasticized polyvinyl chloride in nitrogen

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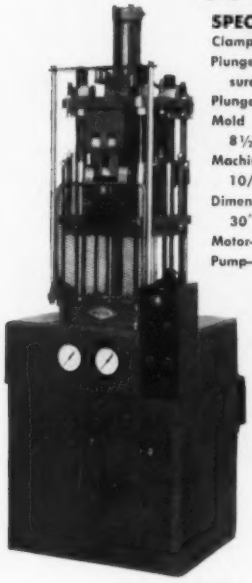
50-TON



SPECIFICATIONS:

Clamping Pressure—50 Tons
Plunger or Transfer Cylinder Pressure—9½ Tons
Plunger Stroke—4 Inches
Mold Space between Tie Rods—8½"x8½"
Machine to Cycle (Dry Run)—10/Minute
Dimensions—Height 89" — Width 30"—Length 24"
Motor—5 HP
Pump—8 G.P.M.

FEATURING:

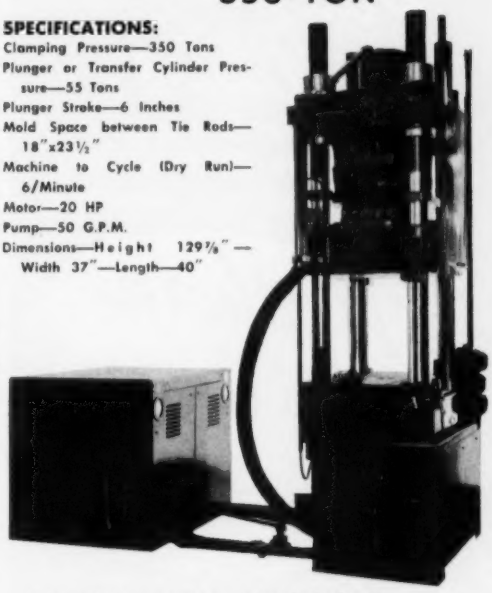
Bottom-up acting transfer or plunger ram, rugged clamping mechanism, fast action throughout. For additional specifications and information concerning our complete line of equipment send for our new bulletin P-102.

IMPCO

350-TON

SPECIFICATIONS:

Clamping Pressure—350 Tons
Plunger or Transfer Cylinder Pressure—55 Tons
Plunger Stroke—6 Inches
Mold Space between Tie Rods—18"x23½"
Machine to Cycle (Dry Run)—6/Minute
Motor—20 HP
Pump—50 G.P.M.
Dimensions—Height 129⅞" — Width 37"—Length—40"



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PICTURED ABOVE IS OUR MODERN SHOP AND OFFICES housing over 14,000 square feet of floor area exclusively devoted to engineering and fabricating molds to exacting specifications. This plant was designed to keep abreast of the custom molders' tooling demands, with necessary ceiling and floor load capacities required to fabricate molds up to the 12 ton television cabinets which we have recently completed.

RICHARD O. SCHULZ CO.

ELMWOOD PARK, ILLINOIS

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DIE CASTING DIES • PLASTIC INJECTION AND COMPRESSION MOLDS

without stabilizer heated at 170° C. in nitrogen and in air.

In a current of nitrogen the basic decomposition rate of the plasticized stock is appreciably faster than for unplasticized polymer. After a prolonged induction period the rate approaches a steady state. The presence of lead stearate results in an inhibition of hydrogen chloride evolution, presumably by reaction forming lead chloride, followed by a rate of evolution comparable with that of the unstabilized stock. This checks fairly well with the quantity of lead stearate present (0.026 milliequivalents) as compared with the hydrogen chloride absorbed (0.017 millimoles). The dibutyl tin dilaurate stock on the other hand liberates hydrogen chloride slowly for an extended induction period, then assumes a rate comparable with that of the unstabilized control. The 0.05 millimoles differential between the dibutyl tin dilaurate curve and the control suggests the absorption of 4 moles of hydrogen chloride per mole of stabilizer. The formation and retention of stannic chloride are difficult to accept unless one assumes the possibility of a complex with dioctyl phthalate, or possibly lauric acid. The stable pentahydrate of stannic chloride suggests such a possibility. Only a slight difference in color existed between the control and the two stabilized stocks.

The results obtained when air was used as the sweeping gas (Fig. 13) present an entirely different picture. In the presence of air, more hydrogen chloride is given up by the stabilized stocks than by the control and for the lead stearate stock the rate following the induction period is definitely faster. Dibutyl tin dilaurate does not seem to be a hydrogen chloride acceptor, as a change in rate was not observed. The fact that the function of the stabilizer is to prevent discoloration rather than to inhibit the evolution of hydrogen chloride is probably the key to the answer. Heavy metal stabilizers may function as oxidation catalysts for the disruption of the chromophoric polyene groups. A parallel of this action is found in the use of heavy metal soaps (including lead soaps) as oxidation catalysts in drying oils.

In the case of milled but not

Fig. 13—Thermal decomposition of plasticized P.V.C. (molded stock) in air

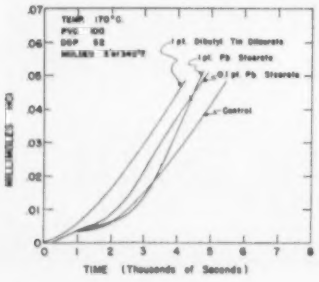
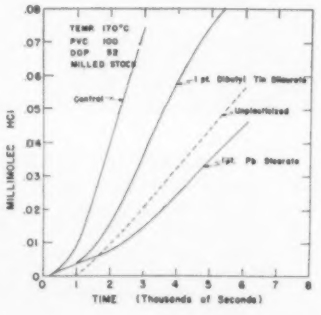


Fig. 14—Thermal decomposition of plasticized P.V.C. (milled stock) in air



molded stocks a considerable amount of hydrogen chloride inhibition is produced by both lead stearate and dibutyl tin dilaurate (Fig. 14). In the light of the results with molded stocks this is not easily explained. Complete solvation of the polymer molecules has not occurred at this stage, nor has the stabilizer been completely dispersed throughout the system. These facts may interfere somewhat with oxidation catalysis. At the present time a clear picture is lacking.

Action of Light

The quantitative aspects of light exposure were not made a part of this study. Rather, a qualitative examination was made from which certain generalizations may be drawn. The amount of hydrogen chloride liberated upon prolonged exposure of polyvinyl chloride to ultra-violet light is small. The most important effect is the sensitization to thermal breakdown in which oxygen probably plays an important role. Figure 15 demonstrates the significant effect of ultra-violet exposure upon thermal stability. Here, the unplasticized polymer was placed

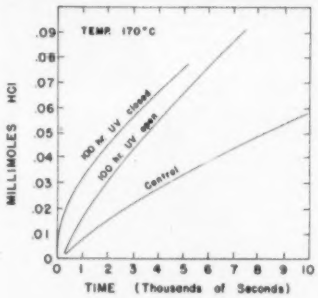


Fig. 15—Thermal decomposition of irradiated polyvinyl chloride in nitrogen

in Corex tubes and rotated under a source of ultra-violet light. The increased sensitivity of the polymer in the closed tube over the one open to the atmosphere is further evidence of hydrogen chloride catalysis of the oxygen mechanism. The fall in rate may be attributed to exhaustion of the points of activation initiated by the combined effect of ultra-violet light and oxygen.

To demonstrate that oxygen was taken up in the process of irradiation the apparatus shown in Fig. 2 was used. Of the two polymers

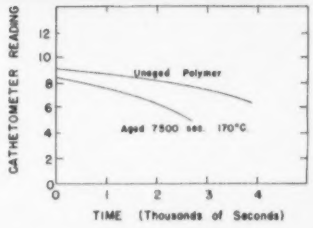
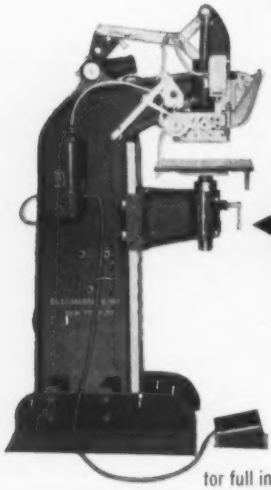


Fig. 16—Oxygen absorption by irradiated P.V.C., for aged and unaged polymer

studied, one had been subjected to heating for 7500 sec. at 170° C., whereas the other was unaged. The pressure drop was measurable and decidedly greater for the aged sample (Fig. 16). Oxygen attack on the polyene groups is indicated by the fact that ultra-violet exposure in the presence of air will bleach thermally discolored polymer.

It can be assumed with reasonable confidence that ultra-violet exposure results in the formation of free radicals on the polymer chain, which then react with available atmospheric oxygen. The resulting peroxide groups usually are in such position that they activate a chlorine



atom, thus giving rise to a weak spot on the polymer. Oxygen attack on polyene portions of the polymer system may not affect a chlorine atom directly, but possibly indirectly through peroxide free radical action.

Conclusions

The thermal degradation of polyvinyl chloride in an atmosphere of nitrogen proceeds at a diminishing rate as the points of higher chlorine atom lability, which are normally present in the polymer molecule, disappear through dehydrochlorination. In the presence of oxygen a rising rate is noted due to the continuous generation of new labile chlorine atoms by an oxidative process. Liberated hydrogen chloride acts as a catalyst for thermal degradation when oxygen is present.

The steady increase in molecular weight during the thermal degradation in nitrogen indicates a cross dehydrochlorination mechanism. In the presence of oxygen, both chain scission and cross linking take place with the latter predominating after the early stages.

Heavy metal-type stabilizers probably act as oxidation catalysts in destruction of polyene chromophores.

Ultra-violet light in the presence of oxygen produces points of higher chlorine lability, which are sensitive to thermal exposure. The points may be due to the proximity of oxygen-carbon linkages resulting from the attack of oxygen on free radicals produced by irradiation.

The authors wish to thank Mr. V. L. Folt and Mr. M. R. Walters for providing portions of the data and for their helpful consultation.

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Crazing of Acrylics

(*Continued from pp.* 130-138)

day variability contributes roughly another 15% variability. The coefficient of variation of the crazed specimens, 15%, is significantly greater than the corresponding value, 5%, for the control specimens. These data for the coefficient of variation are in good agreement with similar data described above.

Conclusions

1. When tensile specimens of heat-resistant and ordinary-grade polymethyl-methacrylate sheet are stress-solvent crazed with benzene in a controlled manner to produce crazing cracks roughly 1 mm. in length and 0.1 to 0.2 mm. in depth and with a density of about 2 cracks per sq. mm., the strength is reduced approximately 30 percent.

2. The coefficient of variation of the tensile strength of the crazed specimens is approximately 15% compared with about 5% for the controls. In addition, although the crazing was done in a controlled manner, there is a daily variation in the treatment that contributes an additional variability of roughly 15% to the coefficient of variation for the crazed specimens.

3. The tensile strength of a specimen of polymethyl methacrylate, crazed to the extent indicated above, cannot be predicted from the appearance of the crazing.

4. The use of acrylic aircraft enclosures that contain crazing as severe or more so than that described above is not recommended if, in service, tensile stresses normal to the crazing cracks exist.

Acknowledgement

This investigation was conducted at the National Bureau of Standards under the sponsorship and with the financial assistance of the National Advisory Committee for Aeronautics. The courtesy of E. I. du Pont de Nemours & Co. and Resinous Products Div. of Rohm & Haas Co. in furnishing material for use in this investigation is gratefully acknowledged. The assistance of Miss Mary Jo Watson in performing some of the early experiments and of Mr. John Mandel who made the statistical analysis, is appreciated.—END

THE PLASTISCOPE*

NEWS AND INTERPRETATIONS OF THE NEWS

By R. L. Van Boskirk

Creative Age Discovers Kentucky

THIS Creative Age is only beginning to find fulfillment for the improvement of men's lives, said J. R. Hoover, president of B. F. Goodrich, at Calvert City, Ky. The occasion was the joint formal opening of chemical plants operated by B. F. Goodrich Chemical Co., Air Reduction Co., Inc., and Pennsylvania Salt Mfg. Co. Calvert City is 30 miles east of Paducah.

A great part of this Creative Age's fecundity, continued Mr. Hoover, comes from the chemical industry which has shown an average 10% annual growth since 1925 compared with 3% for all industry. Its technology stemming from research is the most powerful competitive force in our free enterprise economy. Research causes obsolescence and creative obsolescence is the life blood of the chemical industry. If you don't keep yourself in business by research, your competitors surely will put you out of business, he warned.

His words fittingly appraised a situation in which the chemical part of the Creative Age is creating a new industrial area in the heart of America. Another Charleston area may here be aborning where the Tennessee and Cumberland rivers join the Ohio and not far from where the latter flows into the Mississippi.

A $30,000,000 Investment—Already the chemical industry's investment in the Calvert City area alone is $30 million and in the Atomic Energy plant, 14 miles west of Paducah at Kevil, Ky., is the new $500 million plant to produce uranium 235, with another $459 million appropriated for expansion.

Not far off, perhaps ultimately to form a southern boundary mark for this budding mid-Mississippi river chemical area, is the Woodstock, Tenn., development, 11 miles north of Memphis, where Du Pont is building a $20 million plant for sodium cyanide and hydrogen peroxide; Montana Feralloys, Inc. has located a $1 million feralloy chrome plant; and W. R. Grace Chemical Co. will build a $20 million plant for ammonia and urea.

The Illinois Central Railroad Industrial Development Dept. claims that the following chemical companies are among those negotiating for sites in this area from Henderson, Ky., to Memphis, Tenn.: Columbia-Southern Chemical, Calvert City, Ky.; Monsanto, Henderson, Ky.; Pittsburgh Coke & Chemical Co., Union Carbide, and Schenley Distilleries at unnamed sites; Olin Industries for cellophane at Henderson, Ky., and also considering an aluminum plant in western Kentucky.

Low-Cost Electric Power—The TVA system with its low-cost power was probably the original impetus that started industry moving into this area. The need for electric power has grown so much that steam plants are now abuilding to supplement the hydroelectric power. The proprietor of a weekly newspaper in the area says that his total cost for electricity is only $17 a month for enough current to operate about 20 motors and heat his building. Low-cost water transportation for such products as sulfur and salt from Louisiana for Pennsylvania Salt Co., good rail transportation for coal and other products, and proximity of the Kentucky fluorspar beds were other contributing factors.

Vinyl Chloride Monomer—The B. F. Goodrich Chemical Co.'s vinyl chloride monomer plant in Calvert City is an example of the integration which is necessary between plants in the chemical industry and helps to explain, for example, why a shortage of one material often results in a chain reaction that may affect dozens of end products. The vinyl chloride plant which is now operating at about 40% of capacity produces part of its own hydrogen chloride gas, but will be dependent upon Pennsylvania Salt for piped-in additional supplies when ready for full-scale production. Acetylene is piped in from the nearby Air Reduction Co. plant. After the two gases are combined to form vinyl chloride monomer, they are shipped out in pressurized tank cars (it would boil away into gas unless under pressure) to two of the company's vinyl chloride polymerization plants in Louisville and Avon Lake, near Cleveland. The chemical plant represents an investment of over $6 million—it is located on a tract of 175 acres, thus leaving plenty of room for expansion. Tom B. Nantz is manager of the Goodrich plant.

Chlorine and Hydrofluoric Acid—In addition to anhydrous hydrogen chloride, the Pennsylvania Salt plant produces hydrofluoric and sulfuric acid. Chlorine and caustic soda, from the new De Nora mercury cells under license from Monsanto, will also soon be in production. This chlor-caustic plant, which will eventually produce 55 tons of chlorine a day, is one of only four on this continent designed to produce by the new and efficient mercury cell method. The HF mentioned above is used for uranium hexafluoride and fluorchemicals that are used for refrigerants, aerosol propellants, wetting agents, insecticides, and fluorcarbon plastics.

Acetylene in Quantity—Air Reduction's plant, operated by its National Carbide Div., will soon double its present calcium carbide and acetylene production of 142,500 tons a year. Its present acetylene production is piped to the neighboring Goodrich plant and its carbide is shipped to Louisville where it is converted by Goodrich and Du Pont into acetylene for vinyl chloride and Neoprene, respectively.

Air Reduction owns 1500 acres in Calvert City. The Goodrich plant was erected on a site bought from Air Reduction. Obviously, the company expects to entice other companies into the area to use piped-in acetylene. There is plenty of acetylene in other locations to supply this gas for welding and cutting, which is the one big use not concerned with chemicals.

Acetylene for Plastics—The principal uses of acetylene for plastics are in vinyl chloride, vinyl acetate, and acrylonitrile; it is also reacted

* Reg. U. S. Pat. Off.

with itself to get vinyl acetylene and then reacted with hydrochloric acid to obtain chloroprene or Neoprene synthetic rubber, of which 132 million lb. were produced in 1951.

It might also be pointed out that Rohm & Haas will reportedly use acetylene in their acrylic esters process at their new Texas plant. Trichloroethylene, widely used for degreasing metal, is another user of acetylene. In Germany, acetylene is used for production of alcohol and polyethylene, but the Germans have almost no ethylene and plenty of coal, so acetylene is more economical.

It is conceivable that Air Reduction itself, or some good customer, could be induced to build a vinyl acetate plant on the site, even though Celanese has already announced a new vinyl acetate plant which won't require acetylene. If a bigger market can be found for vinyl acetate, this site would be a most natural location for additional capacity. It goes without saying that any other plant needing acetylene, be it acrylonitrile, acrylics, trichloroethylene, or anything else, is a logical prospect for this area.

The Calvert City area represents vast possibilities for chemicals and plastics. When chlorine; caustic; hydrochloric and hydrofluoric acid; hydrogen; acetylene; cheap power; plenty of water; and good transportation can all be found in such close proximity, it is a lead-pipe cinch that chemical management will find a way to put them together to make end products for customers.

Polyethylene

SCARCITY of polyethylene still remains a main feature of today's over-all plastics outlook. Production problems of one of the producers not only add to polyethylene processors' scarcity problems but are a warning to all companies that would produce polyethylene in the future that the path to big volume production is full of thorns before the roses can be plucked.

Several companies have announced production plans that would bring new plants on stream within the next 18 to 24 months, and more such announcements may be expected soon; on the other hand, some of those who have had intentions of producing polyethylene have changed their minds. There are few observers who believe that more than one or two new producers will be in the field before 1956.

Price Reduction Announced—In the meantime, Bakelite, present largest volume producer, has taken pains to stress its position by holding a huge demonstration for the press to illustrate its position in the industry and, in an even more forceful way, has demonstrated its intentions to broaden the market by lowering the price 3¢ a pound. Bakelite's regular polyethylene resin, the most generally used material, is now 44¢ a lb. in truckload lots in comparison to 47¢ a month ago, and special compounds such as those used for squeezable bottles are 47 instead of 50 cents. Plax Corp., largest processor of bottles, has followed the lead by reducing the cost of bottles by two percent. Colored polyethylene compounds are now 53½¢ and electrical compounds are 49 cents. Ten years ago polyethylene was $1 a pound. In the last seven months, the price has been reduced twice, a total of 5¢ a lb. since September 1952.

Since the specific gravity of polyethylene is 0.92 and that of polystyrene is 1.05 and their respective prices are 44 and 32½¢ per lb. for clear resin, the comparative price differential between them now is the equivalent of 40.5¢ for polyethylene to 34.2¢ for polystyrene.

Possible Volume for 1956—By the end of 1955, Bakelite will have a capacity volume of over 250 million lb. and has no hesitancy in stating that it will expand even more if the situation should warrant such a move. If companies already announced* are ready to produce at that time, the total volume would result in a poundage capacity approaching 500 million pounds. Du Pont has never announced its plans and it is possible that added volume by that company over its soon-to-be-expected new increment, plus possible production by one or two companies whose position is not clear, would bring total volume over 500 million lb. in 1956. Where it will go after that is anybody's guess, but apparently Bakelite seems determined to keep its leading volume position, come what may.

Largest Expansion in Plastics—Bakelite asserts that theirs is the largest volume expansion in a short time ever made in the plastics industry. Total volume production of all polyethylene in 1947 was less than 20 million lb., so it is not difficult to grasp the magnitude of growth that has been made by this remarkable plastic first used in radar and now an almost indispensable item in nearly all kitchens in the United States, as well as in hundreds of industrial and other domestic uses that seem to multiply by the day.

* Present producers are Bakelite and Du Pont. Those who have announced their intentions to produce are Texas-Eastman; Dow Chemical; Monsanto Chemical; and Spencer Chemical.

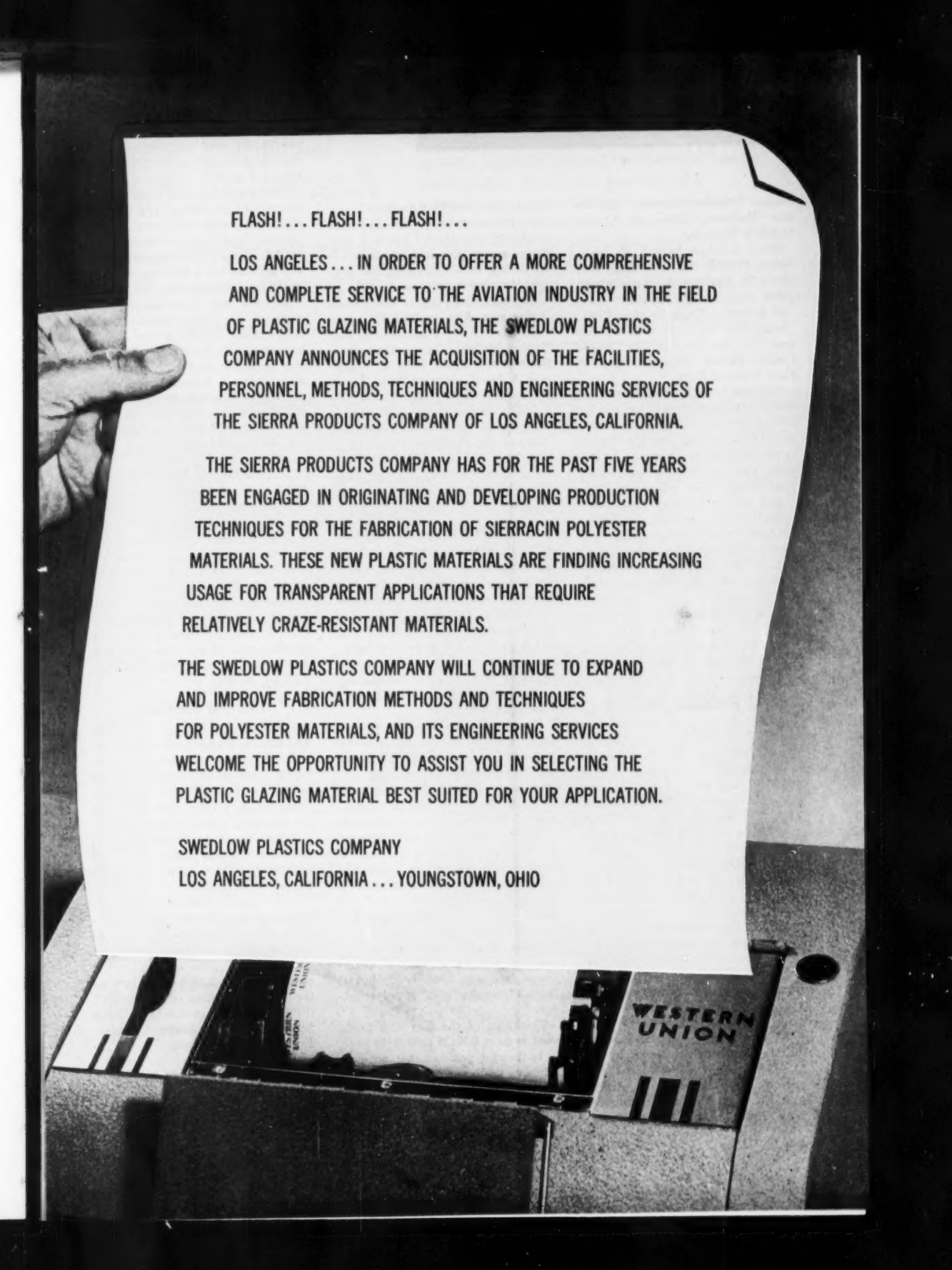
Design and Large Moldings

AN innovation in public and engineering relations was established at the first joint conference on design in large thermosetting plastics moldings sponsored by the S.P.I. Committee on Large Plastics Moldings and the Society of Industrial Designers. The one-day session was held at the Engineers' Club, New York, on April 15 and was organized by John Sasso, coordinator of the S.P.I. committee concerned.

Over-all chairman of the conference was Jean O. Reinecke, president, Society of Industrial Designers. Introductory speaker was Gordon Brown, president, S.P.I.

For the morning session, which dealt with furniture and home furnishings, moderator was Julien Elfenbein, Editorial Director, home furnishings group, Haire Business Publications. Panel members of the morning session were Frank J. Donohue, Monsanto Chemical Co.; Dr. Maurice H. Bigelow, Plaskon Div., Libbey-Owens-Ford Glass Co.; John Bachner, Chicago Molded Products Corp.; C. M. Norris, American Insulator Corp.; Egmont Arens, S.I.D.; Peter Schladermundt, S.I.D.; and Henry Gordon, Warren Furniture Mfg. Company.

For the afternoon session, which treated with television cabinets, air conditioning units, radio sets, home appliances, office equipment and machines, construction components, and


FLASH!... FLASH!... FLASH!...
LOS ANGELES... IN ORDER TO OFFER A MORE COMPREHENSIVE AND COMPLETE SERVICE TO THE AVIATION INDUSTRY IN THE FIELD OF PLASTIC GLAZING MATERIALS, THE SWEDLOW PLASTICS COMPANY ANNOUNCES THE ACQUISITION OF THE FACILITIES, PERSONNEL, METHODS, TECHNIQUES AND ENGINEERING SERVICES OF THE SIERRA PRODUCTS COMPANY OF LOS ANGELES, CALIFORNIA.
THE SIERRA PRODUCTS COMPANY HAS FOR THE PAST FIVE YEARS BEEN ENGAGED IN ORIGINATING AND DEVELOPING PRODUCTION TECHNIQUES FOR THE FABRICATION OF SIERRACIN POLYESTER MATERIALS. THESE NEW PLASTIC MATERIALS ARE FINDING INCREASING USAGE FOR TRANSPARENT APPLICATIONS THAT REQUIRE RELATIVELY CRAZE-RESISTANT MATERIALS.
THE SWEDLOW PLASTICS COMPANY WILL CONTINUE TO EXPAND AND IMPROVE FABRICATION METHODS AND TECHNIQUES FOR POLYESTER MATERIALS, AND ITS ENGINEERING SERVICES WELCOME THE OPPORTUNITY TO ASSIST YOU IN SELECTING THE PLASTIC GLAZING MATERIAL BEST SUITED FOR YOUR APPLICATION.
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display fixtures, moderator was Hiram McCann, Editor of MODERN PLASTICS Magazine.

Panel members were E. F. Borro, Durez Plastics and Chemicals, Inc.; Harry W. Cyphers, American Cyanamid Co.; A. N. Williams, General American Transportation Corp.; Walter Dorwin Teague, S.I.D.; Arthur N. BecVar, S.I.D.; Donald Dailey, Servel, Inc.; and Gay B. New, Admiral Corp.

Discussion at both sessions and during the lunch rotated around the functional, economical, and merchandising reasons for the use of large moldings of phenolics, melamines, and ureas. Thorough study was given to the relationship between mold costs and piece costs, design factors for large moldings, composite structures, color and decoration, transportation of parts, and both the new fibrous glass reinforced phenolics and the new large-area urea materials.

At a meeting of the Committee following the conference, it was decided to hold a similar one-day session in Chicago probably sometime in June.

Heat Resistant Stabilizer

A NEW member of the Stabelan family called Stabelan HR, designed particularly for heat resistance, although it also has good light stability, has been announced by Harwick Standard Chemical Co., 2595 E. State St., Trenton 9, N.J.

Stabelan HR is a synergized and chelated Cadmium and Barium compounded stabilizer. It is a heavy paste at 75° F. and becomes more fluid with the increase of temperature. The product is easily dispersed in dry preblends as well as in solutions and dispersions. To facilitate dispersion, Stabelan HR can be premixed with plasticizers before incorporation in the dry preblend.

Rigid Vinyl Licensees

SEVERAL new licensee-fabricators have been announced by Dr. M. J. Pagerie, vice president and general sales manager of American Lucoflex, Inc., 500 Fifth Ave., New York 17, N.Y. These companies are licensed by American Lucoflex to fabricate non-plasticized hard polyvinyl chloride for use as a corrosion resistant material in the electroplating, food processing, and general chemical industries.

The new licensees in the United States are: Amplex Mfg. Co., 2325 Fairmount Ave., Philadelphia, Pa.; Brunswick Mfg. Co., 61 Hampshire St., Boston, Mass.; Paul A. Chapman & Assoc., Johnson City, Tenn.; Pabst Engineering Equipment Co., 676 Pennsylvania Ave., Elizabeth, N.J.; Prince Rubber Co., Inc., 889 Niagara St., Buffalo, N.Y.; Corrosion Engineers, Inc., 1930 W. Rosecrans Ave., Gardena, Calif.; and Colorvision Plastics, Inc., 247 Atlantic Ave., Boston, Mass.

Polyethylene for Bananas

EXPERIMENTS are now being conducted to evaluate the use of tubular polyethylene film in shipment of banana stalks. Spokesmen for the Fruit Dispatch Co. state that the project is still experimental, and, although they are hopeful of satisfactory results, there is still no decision as to whether or not the experimental project will become standard practice.

The end result of the polyethylene packaging would mean improvement in the appearance of the fruit in that the film prevents scarring and shrinkage of the bananas, helps to preserve the waxy, yellow appearance of the skin, and is even thought to help retain the full natural flavor. Furthermore, the film is easy to handle because of its glove-like clinging and feel in comparison to a waxed paper bag which is stiff and harsh. Also, the waxed paper bag does not have visibility and has to be torn off at dockside so that the bananas can be examined. Cellophane has also been tried, but it doesn't have the "give" of polyethylene.

Thickness of the film now being used is from 0.00125 to 0.00150 gage. It is thought possible that an even thinner 0.001-gage film may be adaptable. The film is purchased in tubular form and sent to the banana farm where it is cut to proper length, opened up, and pulled over the banana stem or stalk. One corner is tied and one corner is left open at each end to permit ventilation.

This ventilation is a most important part of the process and upon its success depends the future of polyethylene packaging for bananas. The fruit is shipped in refrigerated ships and the film has a tendency to block off the air thus causing the fruit to ripen too fast. Consequently, the shippers are experimenting with temperature control in the ship to help eliminate this trouble. They are also experimenting with perforated film which is punched with holes about 4 in. apart. It is possible that this perforated film may be more applicable than tying the bags with one corner open.

Plastics Exposition

THE Sixth National Plastics Exposition will be held the week of June 6, 1954 at the Cleveland Auditorium, Cleveland, Ohio. Hotels in Cleveland have guaranteed that at least 3000 rooms will be available for those attending the exposition.

Chairman of the committee is Harry Grunnagle of Westinghouse Electric Corp., Pittsburgh, Pa. The first meeting of the committee was held on April 24 at White Sulphur Springs, W. Va.

Film for Television

SOME of the details printed in Eastman Kodak Co.'s annual report are of more than passing interest to the plastics industry. Listed below are a few of the significant items which pertain particularly to the company's plastics activities:

Television used 400 million ft. of cellulose acetate film from all sources in 1952, a gain of some 50 million ft. over 1951.

At Tennessee Eastman Co., a subsidiary of Eastman Kodak Co., a pilot plant was put into operation to produce samples of a new acrylic fiber for trade trials as part of the company's experimental program on the newer synthetics.

New roll-coating machines have been installed at Eastman Kodak, Kodak Park, Rochester, N. Y., to make film base.

At the Texas Eastman Co., Longview, Texas, all production units originally planned were completed in 1952. These included units for

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For accurate, positive temperature control, Wheelco is specified as standard on the Lester Model L-3½-48 oz. Injection Molding Machine. Two Capacitrol Instruments, with built-in Capaciline, are used for the preheat sections of the cylinder. Three Capacitrols, with Capaciline, provide automatic co-ordination of power input to demand on the plasticizing section of the injection chamber. Instantaneous instrument response translates temperature measurements into control action quickly, accurately. Result—the correct control temperature for each plastic material, greater product uniformity and improved quality on every job.

Wheelco Panelmount Capacitrol, an indicating pyrometer controller, operates *electronically*. Controls all temperature ranges in plastics within closest limits.

Lester Model L-3½-48 oz. horizontal injection molding machine, manufactured by Lester Engineering Company, has capacity up to 350 shots per hour. Lester engineers specify Wheelco Capacitrols for best control of temperature variable. Sensing elements are thermocouples. Control circuit uses simple relay for energizing and de-energizing resistance-type heaters. Electronic circuit controls electric power input, making precise, instantaneous adjustments to maintain preset temperature. Simplicity of design and assembly of Wheelco Instruments —plus serviceability and superiority over other types of temperature control—assures high quality molding, low equipment and operating costs.

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butyraldehydes, 2-ethyl hexanol, and isobutyl alcohol. Work was started on new equipment to convert isobutyraldehyde into isobutyl alcohol.

At the Kingsport plant of Tennessee Eastman, a project to increase capacity for cellulose esters used in films and plastics was begun in 1952 and will be finished in 1953.

Sales of cellulose plastics for 1952 were below 1951, but the fourth quarter showed a big increase, and in fact, was the best ever. Estimates point to a rise in plastics sales for 1953.

High-Powered Solvents

SIMULTANEOUS announcement of a versatile new solvent was recently made by both Du Pont and Rohm & Haas Co.

The new material, called Dimethyl formamide, is the lowest member of the N-dialkyl amide family which readily dissolves organic compounds, inorganic salts, and materials that have always been in the "hard to dissolve" category. It is already recognized as an excellent paint remover.

D.M.F. mixes completely with water, ether, alcohols, ester, ketones, and chlorinated and aromatic hydrocarbons. The compound is a particularly effective solvent for acrylics and vinyl-type resins.

Vinyl Paint

DEVELOPMENT of a vinyl coating system which, it is claimed, will sweep away the traditional vinyl coating handicaps of poor adhesion, low "build," and impractical surface preparation and priming requirements is announced by Prufcoat Laboratories, Inc., 50 E. 42nd St., New York 17, N. Y.

It is reported that this new Prufcoat primer is specifically formulated for use with active-solvent synthetics, and particularly with vinyl coatings.

The producer claims that the dry Primer P-50 film presents a surface to which any properly formulated vinyl coating adheres with unprecedented tenacity. It is never lifted or adversely affected by vinyl top coat applications. Furthermore, the new primer bonds to and is easily applied to most old paints of any base. This characteristic makes the Prufcoat system satisfactory for repainting old, relatively sound painted surfaces in simple accordance with conventional maintenance procedures.

A 4-page technical bulletin on the subject may be acquired from Prufcoat Laboratories.

Low Pressure Laminate

DEVELOPMENT of a low pressure laminating material, called Sunform, has been announced by Electro-Technical Products Div. of Sun Chemical Corp., Nutley 10, N.J. Sunform, a glass cloth impregnated with polyester resin plus catalyst, is ready for forming just as it arrives from the factory. It unrolls like a roll of cloth.

No refrigeration is necessary to store Sunform—it can be stored for six months at normal room temperatures up to 70° F.

Joint Compound for Pipe

SUCCESSFUL use of a joint compound in stick form when used for thermoplastic pipes and fittings is claimed by the producer, Lake Chemical Co., 3052 W. Carroll Ave., Chicago 12, Ill.

The new material, called Pipetite-Stik, is reported to be inert and non-reactive to chemical re-agents, will withstand temperature variations and deflections, and holds pressures up to 5000 p.s.i.

Chemical Nickel Plating

STRETCHING the available nickel supply—always less than demand—is one important aspect of a newly announced method of chemical plating as distinguished from electroplating. Developed by General American Transportation Corp., 135 S. LaSalle St., Chicago 90, Ill., the process has been applied to various plastics as well as to ferrous and non-ferrous metals.

It is reported that the new process, called Kanigen, results in plated surfaces which give the same protection with one-half to two-thirds less nickel than would be required for electroplating. In addition, the chemical plating process produces such a uniform surface that it is unnecessary to overplate; at the same time, porosity of the nickel surface is reported to be virtually zero. Thickness uniformity of the plating is possible without regard to size or shape of the item plated.

Certificates of Necessity

TWO grants in the last publication of Certificates of Necessity are of interest to the plastics industry.

Melamine Plastics Corp., Winona, Minn., was granted a 50% tax adjustment on a $52,000 application for enlargement of their plant. The company makes melamine molding compounds and specializes in rag-filled melamine which is used in dishware by the Quartermaster Corps.

Allied Chemical & Dye Co. received a 60% tax adjustment for a $550,000 investment for a plant in Baton Rouge, La. It is anticipated that Allied will produce Genetron in this plant. Genetron is a fluorinate similar to Freon. There is talk in the trade that this company's output will be used to supply Bakelite's new plant for production of fluorothene.

General Purpose Phenolic

DEVELOPMENT of a new general purpose phenolic thermosetting compound in black or brown is announced by The Borden Co.'s Chemical Div. Designated as Durite GP-151, the product is reported to have versatile molding characteristics and is an extremely fast curing material with excellent appearance in all flow ranges.

Durite GP-151 sells for slightly more than 20¢ a pound. Further information may be obtained from the Durite Products Dept., The Borden Co., Chemical Div., 5000 Summerdale Ave., Philadelphia 24, Pa.

Strux in Larger Sizes

DEVELOPMENT of a new machine that extrudes larger sizes of Strux now makes it possible to produce finished pieces in almost any reasonable size or shape.

The material, which is also known as cellular cellulose acetate, is now available in various sizes of boards ranging from ½ by 8 in. to 2 by 8 in., and in rods varying from $1\frac{1}{16}$ to 3 in. in diameter. Special shapes may also be produced, since relatively inexpensive dies are used.

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Weighing only 5 to 8 lb. per cu. ft., Strux is lighter than balsa wood. Yet, in the 7-lb. density, it has a compressive strength of approximately 200 lb. per sq. inch. The material has found acceptance as reinforcement for aircraft control surfaces, helicopter blades, radome housings, and filler blocks under fuel cells.

A sample of the material, together with a descriptive folder containing prices, as well as a price list of Strux sandwich structures, may be obtained from Strux Corp., Lindenhurst, N. Y.

Reinforced Plastics Meeting

PROCEEDINGS of the Eighth Conference of the S.P.I.'s Reinforced Plastics Div. held in Washington, D. C., last February are now being prepared. All of those duly registered at the Washington meeting will automatically receive a proceedings book. There will be extra copies of the book available upon request from S.P.I. at $3 per copy, plus postage.

Orders for the proceedings book should be placed with Charles L. Condit of the Society of the Plastics Industry, 67 W. 44th St., New York, N. Y.

Sugar Cane for Synthetics

CONSTRUCTION will soon begin on a $2,633,000 plant near Lockport, La., by Valentine Pulp & Sugar Co., New Orleans, La., for the production of newsprint and pulp from bagasse. Bagasse is the waste remaining after the juice is pressed from sugar cane. The product of the new plant will be dissolving pulp which is used in the manufacture of rayon, cellophane, and plastics.

A $30 million plant for production of bagasse pulp is also reported to be under consideration on the Philippine Islands, where the entire production will be used for rayon.

Cement for Inflatable Toys

INFLATABLE vinyl toys can now be patched with VC-2, a vinyl cement especially developed for the toy industry by Schwartz Chemical Co., Inc., 326 W. 70th St., New York 23, N. Y. The company reports that several toy manufacturers have tested the adhesive and are providing patch kits containing a small amount of the vinyl cement with every inflatable toy.

The product is also recommended for cementing patches to vinyl covers, tarpaulins, children's wading pools, as well as cementing flexible vinyl doll heads to cloth bodies and hair on vinyl doll heads.

VC-2 is packed in quart and gallon cans, and in 55-gal. steel drums. It can easily be repackaged in small tubes for enclosure in vinyl toy patch kits.

Acrylic Spray

WITH very little fanfare, the use of acrylic sprays as a preservative coating for all kinds of purposes has been growing into substantial volume. Originally introduced as a material especially helpful in the prevention of smudging of artwork, it has gone beyond the commercial artist's workshop into the home where it can be used on leather, metal, wood, and most any other material to give a transparent coating that will protect against corrosion, mildew, rub-off, and most any other type of soiling or surface mar.

The latest producer to come to our attention in this field is Acrolite International, 12 Hollywood Ave., Hillside, N.J., which has announced its entrance into the field with Sprey, an acrylic solution packed in a spray can with a specially contrived safety valve that makes its application even easier.

Alkyds in Television

ONE million television tuner boards molded from Plaskon's alkyd molding material have now been molded by Wilcox Plastics, Inc. for Standard Coil Products Co. In commemoration of this achievement, Plaskon presented awards to Frank Wilcox and Glen Swanson, respective presidents of Wilcox Plastics and Standard Coil, at a luncheon in Los Angeles which was attended by a group of Western plastics manufacturers, engineers, and educators.

Henry DeVore, speaking for Plaskon, noted that Standard Coil is now producing 40% of the tuning boards used in national TV production, and that TV production has jumped from 6500 sets in 1946 to an estimated 7 million this year. He pointed out that in 1952 the West Coast accounted for 12% of total U.S. purchases of television sets.

Mr. DeVore remarked that Wilcox Plastics has grown from a one-man enterprise 20 years ago to a firm which now occupies a 50,000-sq. ft. factory and employs 120 persons. The company's original product, a molded plastic police whistle, is still one of its major production items.

Standard Coil Products was founded 18 years ago to manufacture small radio coils. It now owns five plants in California, Michigan, and Illinois with 280,000 sq. ft. of working space and 6000 factory employees. The company is currently planning expansion by which it will be able to treble its present production.

Squeeze-Bottle Decision

DECISION in a patent infringement case involving plastics bottles has recently been announced by the U.S. Court of Appeals for the 7th Circuit, Chicago, Ill. The case was that of Plax Corp. vs. Elmer E. Mills Corp.; the decision was rendered in favor of Mills.

The rival patented processes under consideration by the Court are for the manufacture of plastics squeeze-type bottles and other containers. The high Court held that a previous lower court decision in favor of Plax was in error and that the Mills processes do not infringe. Earlier findings of the lower court that certain of the Plax patents are valid were affirmed. However, it was stated that there was no similarity in principle between the two manufacturing processes and that, therefore, no patent infringement exists.

Vinyl Thinners

ANNOUNCEMENT of vinyl clears and vinyl ink concentrates which will permit the use of Toluol as a component of a rapid drying solvent blend has been made by Claremont Pigment Dispersion Corp., 110 Wallabout St., Brooklyn 11, N.Y. Through the use of Claremont's vinyl clears with their vinyl ink concentrates, it will be found that mixture of 50% Toluol and 50% MEK will dry as quickly as does MEK when the lat-

AND NOW

Cabol 100

CABOT'S NEW Hydrocarbon Oil Plasticizer for Low Cost Vinyl Compounding

- Pound Volume Cost in the Range of Low Cost Inert Fillers
- Plasticizer Efficiency of 1.5 as Compared with DOP Efficiency of 1.0
- Up to 50% Compatibility with Octyl-Phthalate Type Plasticizers

Available for Immediate Delivery in Commercial Quantities

Investigate the use of **CABOL 100** in your plastics products

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Cabot produces "Cabol 100" used in floor tiles, but does not make the finished product

Plasticizer Division

GODFREY L. CABOT, INC.

77 FRANKLIN ST., BOSTON 10, MASS.

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ter is used in combination with ordinary vinyl inks and clears.

This mixture is claimed to save from 4 to 5¢ per lb. on the cost of ink thinners. The resultant inks mean the elimination of interleafing tissue or spray-powder—a double saving.

EXPANSION

Ball Bros. Co., Inc., Muncie, Ind., well known for its glass containers, metal, rubber, and paper products, has made its entry into a fifth and new field of manufacturing with the acquisition of a majority interest in **Kent Plastics Corp.**, Evansville, Ind. Ball acquired its Kent interest in exchange for a substantial capital investment made in underwriting an expansion which the Evansville company found necessary because of the increasing demand for its products. Kent, organized in 1945, produces plastic functional and decorative parts for the automotive and home appliance industries.

The Kent management, employing approximately 500 people, will remain the same, with **Robert H. Morehouse** as president.

Shawinigan Resins Corp., Springfield, Mass., announces the fourth expansion in its 10-year production of vinyl resins. **Robert K. Mueller**, president of Shawinigan, states that completion of the latest expansion would increase current capacity by 35 percent. He said that since 1945 Shawinigan has expanded four times and quadrupled its productive capacity of vinyl resins. He also pointed out that the major part of this growth is due to the expanded demand for Butvar polyvinyl butyral used in the manufacture of laminated safety glass for automobiles.

Harte & Co., Inc., 267 Fifth Ave., New York 16, N. Y., has completed arrangements for the purchase of the properties of the Greenpoint Ornamental Ironworks and John Hassell & Co. warehouses at Dupont St., Brooklyn, N. Y. Plans are presently being drawn for the rebuilding and the addition of these two factories to the main Harte plant, and it is expected that occupancy will take place in the fall.

This latest expansion is independent of the construction of the new Harte plant which is now under way at Ash St., Brooklyn.

The General Tire & Rubber Co., 1708 Englewood Ave., Akron 9, Ohio, has announced plans for expansion in the chemical and rigid plastics fields. Major steps in General's expansion program will include the construction of a multi-million dollar chemical plant near Ashtabula, Ohio, and the opening of a rigid plastics division at Marion, Ohio.

The company's second chemical facility near Ashtabula—a plant is now in operation at Mogadore, Ohio —will include a polyvinyl chloride resin plant and a pilot plant.

Process of retooling of Marion facilities has already started. **Harold Harmon** has been appointed works manager of the division.

COMPANY NOTES

General Dyestuff Corp., 435 Hudson St., New York 14, N. Y., has appointed **John L. Eich** resident manager of its Chicago sales office, succeeding **E. R. Heintz**, who has been named resident manager of the Philadelphia sales branch. Mr. Eich, formerly assistant sales manager of the New York sales office, has been associated with the company since 1934.

Gane Bros. & Lane, Inc., 1335-45 W. Lake St., Chicago 7, Ill., has taken over the Chicago office, including the entire personnel and stocks of foils and equipment of **Peerless Roll Leaf Co.** The Chicago and midwestern territory will now be served by Peerless Roll Leaf Div. of Gane Bros. & Lane. **Leslie S. Simmonds**, who has been in charge of the Peerless Chicago office, is now manager of the division.

Koppers Co., Inc., Pittsburgh 19, Pa., announces the following appointments in its Chemical Div.: **George M. Walker**, an assistant vice president and manager of the project department of the division in Pittsburgh, has been named vice president. **Walter E. Wright**, former Pittsburgh sales office supervisor for the Chemical Div. is now sales manager of the Western district, and **John L. Taylor**, Western plastic manager. Sales headquarters for the division's Western district are located at 3450 Wilshire Blvd., Los Angeles, Calif. Mr. Wright joined Koppers as a junior chemist in 1943; Mr. Taylor, formerly president of Alladin Plastics, Inc., joined Koppers as a sales representative in 1949.

Akron Presform Mold Co., Cuyahoga Falls, Ohio, producer of aluminum forms for latex-dipped products and dies for rubber and plastics products, has added a new two-story building at one end of the present plant and a wing at the other end to give the company a total of 35,000 sq. ft. of manufacturing area.

St. Maurice Chemicals Ltd., jointly owned by **Heyden Chemical Corp.** of New York and **Shawinigan Chemicals, Ltd.** of Montreal, has acquired the 111-year old **McArthur Chemical Co., Ltd.** of Montreal and Toronto, Canada. McArthur specializes in the resale of organic and inorganic chemicals.

Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio, announces the following personnel changes in its chemical sales staff: **J. P. Clancy** has been transferred from the southern area to New England. He joins **J. M. Washburn** in the responsibility for sales of all Emery products. **C. T. Burgess** succeeds Mr. Clancy and will handle sales in Mississippi, Alabama, Georgia, and the eastern section of Tennessee. **E. W. Sack** and **E. L. Spencer** have been appointed to the sales staff and will assume field sales duties in the near future. Mr. Sack was transferred from Emery's production department where he served as a department supervisor for 11 years; Mr. Spencer was formerly associated with Cincinnati Chemical Works.

W. C. Hardesty Co. of Canada Ltd., Toronto, Ontario, has appointed **T. A. Luscombe** to its sales staff and **P. D. O'Rourke** as sales representative for all Southwestern Ontario. Mr. O'Rourke has been associated with the company for 8 years.

Monsanto Chemical Co.'s Western Div. will move its administrative headquarters from Seattle, Wash., to Santa Clara, Calif. The division will

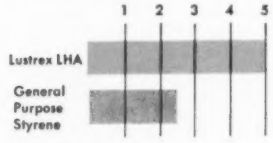
Twice the strength for a penny more

with Lustrex LHA

If you have been using only general purpose styrene, consider the many applications that can benefit from a molding powder that delivers practically double the strength of general purpose material . . . yet costs only one cent a pound more than colored styrene.

Or, if you have been using high impact material that sacrifices gloss for high impact strength, consider the advantages of Monsanto's LUSTREX LHA. For LUSTREX LHA molds with a beautiful surface finish, yet gives you the *added* strength desirable to upgrade toys and housewares . . . the *extra* strength needed for most industrial applications.

COMPARATIVE IZOD IMPACT STRENGTH



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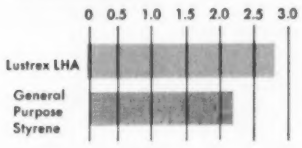

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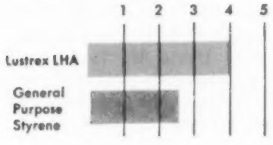

And now you can DRY COLOR Lustrex LHA

You may order LUSTREX LHA in one or more of the eleven colors (including refrigerator white) in which it is offered.

Or, you can have all the advantages of "double tough" styrene, *plus* the economy and flexibility that dry coloring provides: The colors you want . . . when you want them . . . and in the amounts you need.

Benefiting from extensive experience in providing special molding powder for dry coloring, Monsanto has developed a special Colorant Blend of LUSTREX LHA. For complete information on LUSTREX LHA Colorant Blend, just mail the handy coupon. Lustrex: Reg. U. S. Pat. Off.

MONSANTO CHEMICAL COMPANY, Plastics Division, Room 2630, Springfield 2, Mass.
Please send me full information on "double-tough" Lustrex LHA ☐;
Lustrex LHA Colorant Blend ☐.

Name & Title _____

Company _____

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construct a central headquarters building at 2790 Lafayette St. Site of the new building is near the company's plant at Avon, Calif., where sulphuric acid and phenol are produced. Seattle will continue to be sales and production headquarters for Monsanto's line of plywood adhesives, industrial resins, and related products for the lumber and plywood field.

The midwest sales office of **Monsanto's Texas Div.** was moved from Akron, Ohio, to the company's sales offices in the Union Commerce Bldg., Cleveland, Ohio.

Regal Plastic Co. has announced a public offering of 149,500 additional shares of common stock at $2.00 per share through **S. D. Fuller & Co.** The proceeds will be used for working capital, product development, and expansion of the company's facilities in Kansas City, Mo. Net sales for the year 1952 totaled $832,491 and orders on hand exceeded $1 million at the start of 1953.

Thomas Mfg. Co., 80 Clinton St., Newark, N. J., has appointed **Carlton S. Smith** to the newly created post of advertising and sales promotion manager.

O'Hara-Rowan Associates, Bassett Bldg., Summit, N. J., has been recently organized for the design and development of plastics products, particularly for the packaging field. **Harry F. O'Hara** and **Edward W. Rowan** were formerly secretary-treasurer and president, respectively, of Dillon-Beck Mfg. Co., Hillside, N. J.

Celanese Corp. of America announces that its **Plastics Div.** is now located at 290 Ferry St., Newark 5, N. J. The New York district sales office remains at 180 Madison Ave., New York 16, N. Y.

The Chemical Div. of Celanese has announced the following changes and appointments in its personnel: **William C. Goodwine, T. G. Davis,** and **Norman Baker** have been appointed product managers of the New York sales staff for plasticizers, intermediates, and solvents, respectively. **Richard Schwab** has been transferred from the New England territory to become manager of the Detroit area; **Walter Lauer** succeeds Mr. Schwab in New England with headquarters in Boston. **Arthur Dowling** has joined the Chemical Div. as advertising manager. **E. T. Powers,** who has been with the division since 1945, has been promoted to the new position of director of the **Development Dept.**

B. F. Goodrich Co.'s Plastics Div. has acquired the business of Walter W. Metzger, Inc., distributor of Koroseal upholstery to the transportation industry, with headquarters in Detroit, Mich. **A. W. Ketlar,** who has been with the company's Detroit office since 1936, will assume active supervision of the business with offices at 801 Fisher Bldg. **Walter M. Metzger** will be retained as a manufacturer's representative in a consulting role.

The Landers Corp., Toledo, Ohio, reports that its colored movie film, "The Versilan Story," has become a world traveler since its announcement in the February 1952 issue of MODERN PLASTICS. The film, which portrays production methods and consumer uses for calender-coated vinyl upholstery, created so much interest at its original showing during a meeting of the Swedish S.P.I. that all the vinyl processing members of the group asked for a re-run in their own plants, even though all Swedish vinyl upholstery is spread coated rather than calender coated.

Freezer Queen Products Co., 40 S. Clinton St., Chicago 6, Ill., producer of polyethylene packaging, has appointed 11 factory representatives in various parts of the country to handle the company's products. In addition to refrigerator-freezer boxes, bags, and printed polyethylene packaging, the company specializes in a moisture-tight lid which can be labeled with any pencil for identification of contents.

Reinecke & Associates is now located at 155 E. Ohio St., Chicago, Ill.

Presto Plastic Products Co., 11 E. 26th St., New York, N. Y., announces the appointment of **Bernie Wilks** as a sales representative for the **Heavy Gauge Div.** Mr. Wilks was formerly associated with Pantasote Co. and Cohn-Hall-Marx. Presto is launching a new line of heavy-gauge vinyl fabrics for the kitchen and dinette trade, as well as 16 new styled fabrics for upholstery.

Du Pont has opened new district offices for the sale of plastics in Boston and Detroit with the following managers in charge: **Raymond H. Carter** will head the Boston office at 140 Federal St.; **Raymond E. Brady,** the Detroit office in the General Motors Bldg. The company also announces that **Dr. Russell B. Akin,** plastics sales technologist, has been named manager of the Chicago office. Dr. Akin succeeds **Edmund H. Tyson** who has retired after 28 years with Du Pont.

Flek Corp., 2252 E. 37th St., Los Angeles 58, Calif., has been appointed West Coast distributor by **Visking Corp.**, Terre Haute, Ind., for the company's extruded flat tubing made from Kel-F under the name Trithene.

Libbey-Owens-Ford Glass Co., Toledo, Ohio, has issued licenses to the following finishers of industrial glass cloth for use of the Garan finish, an important step in the manufacture of plastic laminates: **United Merchants' Industrial Fabrics Corp.**, 1407 Broadway, New York, N. Y.; **T. E. Thal, Inc.**, 537 S. Commonwealth St., Los Angeles, Calif.; **Glass Fabrics Finishing Co.**, Cedar Grove, N. J. The latter company is jointly owned by **Hess, Goldsmith & Co., Inc.**, New York, N. Y., and **Waldrich Co.**, Delawanna, N. J.

The M. W. Kellogg Co., Jersey City, N. J., a subsidiary of Pullman, Inc., has appointed the following sales representatives to its **Chemical Mfg. Div.: David W. Towler** will cover the Massachusetts territory, **Leo J. Fitzharris,** the Ohio area, and **Chester H. Leder,** the Pacific Coast.

Naugatuck Chemical Div. of U. S. Rubber Co. announces the following appointments: **Harold M. Parsekian** as sales manager for all plastics manufactured by the division; **Dr. Earle S. Ebers,** formerly sales manager of Kralastic and Vibrin resins, has been named director of research and development to replace **M. G. Shepard** who has retired; **Dr. D. Lorin Schoene,** formerly manager of

Majestic Creations, Woodside, N. Y., makes these attractively styled, internally illuminated indoor signs* from white or colored **Nixon V/L Rigid Vinyl Sheeting.** Because the sheeting accepts printing so very readily, the signs can be silk screened to order with any combination of colors.

Signs available in two sizes, 21"x 7½"x4" and 30"x8"x4", screen printed to order. For information: Majestic Creations, Inc. 37-03 Woodside Avenue, Woodside 77, N. Y.

Vacuum forming and deep drawing of sheet plastics are constantly growing in importance as production techniques. Perhaps your product can be made from Nixon V/L Rigid Vinyl Sheeting by one of these methods — better . . . or cheaper . . . or both. Ask your Nixon Salesman. Or write to the office nearest you for details.

* patent pending

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plastics development, is now assistant director of research and development; and **Donald L. McCollum** has been appointed sales-production coordination manager.

Robert Busse & Co., Inc., 109 Broad St., New York 4, N. Y., has been formed to sell and convert acetate, rigid vinyl, styrene, and saran. Robert Busse was formerly vice president of Charles F. Hubbs Co.

Shellmar Products Corp., Mount Vernon, Ohio, announces the formation of a new foreign affiliate, **Shellmar Papelera Industrial, C.A.,** located in Caracas, Venezuela. The new company is an association of Papelera Industrial, paper converters, and Shellmar. **S. P. Congdon,** formerly of Shellmar de Mexico, is production manager, and **Francisco Mendoza A.,** general manager of Papelera Industrial, has been appointed president. The Venezuelan affiliate is the ninth in the Shellmar group of service plants around the world.

Rohm & Haas Co.'s Plastics Dept., Philadelphia 5, Pa., announces that **Robert L. Gardner** will devote full time in the development and promotion of new applications for Plexiglas molding powder. **John G. Vandenberg** will assume the sales service work formerly handled by Mr. Gardner.

Goodall Fabrics, Inc., 525 Madison Ave., New York 22, N. Y., has purchased **The Gooch Co.,** 320 S. Wrenn St., High Point, N. C., formerly a distributor of supported and unsupported plastics for the furniture field manufactured by Goodall. **Charles L. Gooch** has been retained by Goodall as manager and representative.

Baker Castor Oil Co., 120 Broadway, New York 5, N. Y., has named **Don S. Bolley** technical director and **M. Kent Smith** director of commercial chemical development. Mr. Bolley was formerly director of research, and Mr. Smith, director of development.

DuBois Plastic Products, Inc., 170 Florida St., Buffalo, N. Y., has appointed **Richard R. VanGeem** chief engineer and **Raymond C. Confer** assistant general manager of the company.

American Plastics Corp., Bainbridge, N. Y., a wholly-owned subsidiary of **Heyden Chemical Corp.,** has acquired the **Reinforced Plastics Div.** of **Auburn Button Works,** Auburn, N. Y. The entire machinery and equipment of the division has been moved to the Bainbridge plant.

Auburn Button Works has discontinued operation of the division in order to increase production facilities in its Extrusion and Vacuum Forming Divs.

DeBell & Richardson, Inc., Hazardville, Conn., has formed a new corporation called **D & R Plastic Welders, Inc.** The function of the organization will be to develop specialized welding techniques and materials required in various fabricating operations. They will also manufacture D & R hot jet plastic welding torches and develop, fabricate, and test prototypes of plastic articles which are fabricated by the use of welding techniques.

PERSONAL

Dr. Emmette F. Izard of **Du Pont,** Buffalo, N. Y., has won the 1953 Jacob F. Schoellkopf Medal of the American Chemical Society's Western New York section. Dr. Izard was cited for his discovery of polyethylene terephthalate, the basic material from which both Dacron fiber and Mylar film are made, and for his contributions to the development of a process for converting this material into finished fibers and films.

George Rieger of **Hercules Powder Co.'s Market Research Div.,** Wilmington 99, Del., is now program executive of the plastics section of **NPA's Chemical Div.,** Washington, D. C.

J. Boiseau Wiesel, assistant to the general manager of **Hercules Powder Co.'s Cellulose Products Dept.,** Wilmington 99, Del., has recently retired after completing 37 years with the company.

Louis L. Potomac has been elected president of **Reflin Co.,** Gardena, Calif., manufacturers of reinforced plastics pipe. Mr. Potomac was formerly president of Alsynite Co. of America, San Diego, Calif.

L. M. Calhoun has been placed in charge of sales of **Fiber Glass Products Div. of Bigelow-Sanford Carpet Co., Inc.,** 140 Madison Ave., New York 16, N. Y. Bigelow-Sanford is producing a line of fibrous glass mats and fibrous glass cloth for use in reinforced plastics. Mr. Calhoun's previous associations were with Deering, Milliken & Co., Fiber Glass Div. of United Merchants Industrial Fabrics Corp., and Owens-Corning Fiberglas Corp.

Ira Mirsky, formerly comptroller and assistant treasurer of **Ideal Toy Corp.,** 200 Fifth Ave., New York, N. Y., has been elected secretary.

George B. Shapiro has been named sales representative of **The General Tire & Rubber Co.'s Plastics Div.,** Akron, Ohio. He will handle the sales of Fashon, the company's vinyl film and vinyl sheeting, in the metropolitan New York area. Mr. Shapiro was formerly associated with Velveray Corp., Whitman Co., Inc., and Jason Corp.

C. L. Ward has been elected vice president and director of **Kimball Mfg. Corp.,** 1270 Pennsylvania Ave., San Francisco 7, Calif.

Herbert B. Reed is now engineer in charge of installation and service of **Electronic Heating Corp.,** 66 Needham St., Newton Highlands, Mass.

Deceased

Carl E. Johnson, Chairman of the Board of **Sterling Electric Motors, Inc.,** 5401 Anaheim-Telegraph Rd., Los Angeles 22, Calif., died.

MEETINGS

May 20-22—Society for Experimental Stress Analysis, Spring Meeting, Hotel Schroeder, Milwaukee, Wis.

May 27-29—American Society for Quality Control, Seventh Annual Convention, Convention Hall, Philadelphia, Pa.

July 13-17—National Housewares Exhibit, Atlantic City, N. J.

Molded chair designed by Charles Eames for the Herman Miller Furniture Co. Fabricated by Zenith Plastics Co., Gardena, Calif.

ZENITH PLASTICS USES PARAPLEX P-43

Other Zenith Plastics molded items—

RADOME—Unusual electrical and physical properties, resistance to weathering and ability to withstand rigors of combat aviation are reasons why PARAPLEX P-43 was chosen for this critical military use.

AIRCRAFT WINDOW FRAME—High strength at low weight, good fatigue and stress resistance are essentials provided by PARAPLEX P-43.

METER HOUSINGS—Corrosion resistance, excellent weathering, plus humidity resistance make PARAPLEX P-43 an excellent choice for these molded meter housings.

The Charles Eames chair above is but one of the many useful items for which Zenith Plastics Company chose PARAPLEX P-43 polyester resin. Here are some of the properties that make PARAPLEX P-43 so effective:

Ease of Handling—PARAPLEX P-43 is not sensitive to fluctuations in molding temperatures; can be used in all types of molding equipment.

Long Shelf Life—The storage stability of PARAPLEX P-43 is exceptional; inventory problems are reduced to a minimum.

Resists Cracking and Crazing—Even in resin-rich areas, PARAPLEX P-43 is highly resistant to cracking and crazing; an important feature in production molding with rigid-type resins.

High Physical Strength—High flexural and tensile strength, and retention of these properties upon exposure and high humidity, are outstanding advantages of PARAPLEX P-43. This reflects the excellent fibre and pigment wetting characteristics of the resin.

Where high impact strength and toughness are desired, PARAPLEX P-43 rigid polyester can be blended with the flexible PARAPLEX P-13 to give the required strengths. The PARAPLEX P series resins can be catalyzed for room temperature or elevated temperature cure.

Send for technical data—*For up-to-date information on the* PARAPLEX *P-Series resins, write Dept. RL3-1 for our 21-page manual. There's no obligation.*

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

Representatives in principal foreign countries

PARAPLEX *is a trademark, Reg. U. S. Pat. Off. and in principal foreign countries.*

CLASSIFIED ADVERTISEMENTS

MODERN PLASTICS reserves the right to accept, reject or censor classified copy.

EMPLOYMENT • BUSINESS OPPORTUNITIES • EQUIPMENT (used or resale only)

MACHINERY and EQUIPMENT FOR SALE

FOR SALE: Quick delivery Rubber and Plastic Equipment. Farrell 16"x48", and 15"x36", 2 roll rubber mills. Other sizes up to 84". New Seco 6"x12" and 6"x16" Lab. Mixing Mills and Calenders. Rubber & Plastic Extruders. W. S. 350 ton downstroke Hydr. Press, 30"x30" Platens self contained. Birdsboro 250 ton upstroke, 36"x36" Platens. HPM 200 ton Hydr. Press 4 opening, 32"x36" platens. 200 ton Brunswick 21"x21" Platens, 14" Ram, Record Presses. Wat.-Still. 100 ton 24"x24". Elms 75 ton 30"x 36". Also presses Lab. to 2000 tons from 12"x12" to 48"x48". Hydr. Oil Pumps. Gould 75 HP motor Dr. 2 stage Centrif. Pump. 250¢ W.P. W.S. 4 Plgr. High and Low Pressure Hydr. Pump. HPM 5 GPM 2700 lbs. Elmes Hor. Plgr. 4500 lbs. and 5500 lbs. Hydr. Accumulators. Stokes Automatic Molding Presses. Rotary & Single Punch Preform Tablet Machines ½" to 3". Injection Molding Machines 1 oz. to 32 oz Baker Perkins Jacketed Mixers 100, 50, and 9 gal. Plastic Grinders. Heavy duty mixers, grinders, pulverizers, gas boilers, etc. Partial listing. We buy your surplus machinery. STEIN EQUIPMENT CO., 107-8th Street, Brooklyn 15, N. Y., STerling 8-1944.

SAVE WITH GUARANTEED REBUILT EQUIPMENT—RUBBER MIXING MILL, heavy duty 18"x48"; HYDRAULIC PRESSES: 28"x25", 750 ton, 18" ram, HOBBING, 26"x18", 12" main ram, TRANSFER, 170 tons; 20"x20", 10 ram 118 tons, 24"x20", 10" ram, 118 tons; 20"x20", 10" ram, 200 tons, 30"x20" 8" ram, 75 tons, 15"x15", 8" ram, 75 tons, 19"x24", 16" ram, 78 tons, 12"x12", 6½" ram, 50 tons, 14"x14", 8" ram, 50 tons, 8"x8½", 4½" ram, 20 tons, 16"x16", 3½" ram, 10 tons; LABORATORY PRESSES: Carver, model 150, 10 ton, Buehler 10"x7" 12 ton; NEW UNIVERSAL DUAL PUMPING UNITS: 3 to 15 HP; NEW LABORATORY MILLS & CALENDERS: EXTRUDERS: Royle #1 Plastic, insulating type, NRM, 6", strainer type; ACCUMULATOR HPM 6" ram, 2500#. PREFORM PRESSES all sizes, Sample Mixers, Vulcanizers. Injection Molding Machines, etc. UNIVERSAL HYDRAULIC MACHINERY CO., INC., 285 Hudson St., New York 13, N.Y.

FOR SALE: 1—6"x12" Lab. Roller Mill; 1—Baker Perkins Banbury type 10 gal. Mixer, with pressure cover, m.d.; 4 Bolling 18"x18" 5-opening Hydraulic Presses; 1—HPM 4-oz. Injection molding Machine; 2—Ball & Jewell Rotary Cutters; 1—100 gal. Patterson Kneadermaster S/S Mixer; 1—Eureka Rotary Cutter; 1—500 gal. Patterson Reaction jack. agit. Resin Kettles; 7—Dry Mixing Blenders, up to 11,000#; 1—NRM 1" electric heated Plastic Extruder; 2—Day Roball 82 Sifters, 40"x120" screens; 2—Rotex #13, 20"x37" screens; 1—Retex 36"x48" Sifter; 3—Mikro Pulverizers 2TH, 3TH, 2DH. Also Grinders, Extruders, Compression and Injection Molding Presses, etc. Send us your inquiries. Advise us what you have for sale. CONSOLIDATED PRODUCTS CO. INC., 13-14 Park Row, New York 38, N. Y. BArclay 7-0600.

FOR SALE: 28 Ton WS 18"x18" Platen. 50 Ton PRESS 20"x20" Pl., 75 Ton ADAMSON PRESS 26"x26" Pl., 75 Ton WS 15"x15" Pl., 140 Ton WS 23"x17" Pl., 150 Ton HPM Triple Action 36"x36" Pl. 175 Ton HPM 30"x30", 250 Tons WS 28"x24". 300 Ton WS 20"x26". 300 Ton WS 24"x29" Platen. 8-ox. WS, 9-oz. HPM, 4 oz. DeMattia Injection Molding Machines. Accumulators. Laboratory Presses, Platens & Oil Pumps. Pulverizers, Scrap Cutters, Grinders, Ball & Jewell, Cumberland, ALTRON MACHINERY CO., INC., 45 Crosby St., New York 12, N. Y. WOrth 4-8233.

INJECTION MOLDING MACHINES in good operating condition: Two-24 oz. Reed-Prentice; One-22 oz. Impco; Four-12 oz. Lester-Phoenix; One-12oz. Reed-Prentice; One 9 oz. HPM; Seven-8 oz. Reed-Prentice; Three-8 oz. Lester-Phoenix; One-8 oz. Leominster; Two-4 oz. HPM; One-4 oz. Reed-Prentice; One 4 oz. Lester-Phoenix. Reply Box 605, Mdoern Plastics.

LESTER Injection Molding Machines for Sale: 4—12 oz. 1—4 oz. Can be seen in operation. Reply Box 621, Modern Plastics.

FOR SALE AT GREAT SAVINGS: Colton 2 and 3 RP Rotary & 4T Tablet Machines. Mikro (S.S. also), 1SH, 2TH, 3TH, 4TH Pulverizers; Schutz O'Neill Mills. Baker Perkins & Readco Heavy Duty Steam Jacketed, Double Arm 50, 100, 150 gal. Mixers. Baker Perkins 150 gal. D.A. Unidor Jacketed Mixer. Baker Perkins 100 gal. D.A. Vacuum Mixers. J. H. Day, from 8 up to 75 gal., Imperial and Cincinnatus D.A. Jacketed Sigma Blade Mixers. Day & Robinson 100 up to 10,000 lbs. Dry Powder Mixers. Abbe Engineering #10 Rotary Cutter. Package Machy. FA, FA4, Miller, Hayssen 3-7, Scandia auto. Wrappers. Hudson Sharp Campbell auto. Cellophane Wrapper. Rebuilt and Guaranteed. This is only a partial list. Over 5000 machines in stock—available for immediate delivery. Tell us your machinery requirements. UNION STANDARD EQUIPMENT CO., 318-322 Lafayette St., New York 12, N. Y.

FOR SALE: Reinforced Plastic Presses 54"x 144", 30"x60", Injection Presses: 4 & 9 oz. HPM, 6 oz. Watson, 8 oz. Lester, 16 oz. Impco VF 822, 1 & 2 oz. VanDorn. Extruders: 3½" NRM, Royle No. 1 Wire cov. unit. 1¼" MPM w. crosshead. Stokes-Windsor RC 100 Twinscrew. Conveyor 22'x12". Scrap grinders. Ovens. Transfer & Compression Presses. Preform presses: Colton 5½T. Stokes 280C. Kux 25. Sheridan Emboss press No. 9, 42" Slitting & Rewindmachine. 3HP Gasboilers. List your surplus equipment with me. JUSTIN ZENNER, 823 Waveland Ave., Chicago 13, Ill.

WE HANDLE HYDRAULIC PRESSES, pumps and power units of all sizes. Write us your requirements and we will try to help you. We find it impossible to list our equipment in this classified column due to the fact that the equipment is sold before ad is published. For those who seek action look in the New York Times under the Machinery and Tool Column for our regular Sunday Special. HYDRAULIC SAL-PRESS, INC., 386-90 Warren Street, Brooklyn 2, N. Y. MAin 4-7847.

PARTIAL LIST of available machines, may be inspected in operation: 60 ounce Jackson & Church, new 1950. 48 ounce DeMattia w/preplasticizer. 48 ounce Lester, almost new. 24 ounce Reed-Prentice 1947. 22 ounce Impco vertical. $16,000. 12 ounce Lester w/extra evl., $10,000. 12 ounce Reed-Prentice. 12 ounce Fellows-Leominster, new 1950, $17,500. 8 ounce Watson-Stillman, 1944, $7,000. 8 ounce Hy-Mac, new 1946, $6,500. 8 ounce Reed-Prentice. 6 ounce Watson-Stillman, $4,500. 6 ounce Reed-Prentice, new 1938. 4 ounce Impco Horizontal, 1951. 4 ounce Lewis. 4 ounce Windsor, Model SH4, new 1952. 3 ounce Fellows, 2 years old. 2000 Ton Hydraulic Press. 350 Ton Hydraulic Press. Vacuum Plating Machine 4' rotary. We also have available several compression, transfer and preform presses. Acme Machinery & Mfg. Co., P.O. Box 731, 102 Grove St., Worcester, Mass.

FOR SALE 12 OZ. REED. One new 10 D-12 oz. Reed-Prentice Injection Molding Machine, delivered in the last quarter of 1952. FOB Our Plant (Midwest Area) Immediate Delivery—Best Offer. Reply Box 602 Modern Plastics.

INJECTION MOLDING MACHINES in good operating condition: Two-24 oz. Reed-Prentice; One-22 oz. Impco; Four-12 oz. Lester-Phoenix; One-12 oz. Reed-Prentice; One 9 oz. HPM; Seven-8 oz. Reed-Prentice; Three-8 oz. Lester-Phoenix; One-8 oz. Leominster; Two-4 oz. HPM; One-4 oz. Reed-Prentice; One 4 oz. Lester-Phoenix. Reply Box 605, Modern Plastics.

WATSON-STILLMAN, two (2) ounce, vertical injection press, steel frame, with Oilgear auxiliary clamp pump. Also, STOKES fifteen (15) ton automatic compression press. Complete with all instruments. MULTIPLASTICS, 185 Church St., New Haven, Conn.

FOR SALE: 1—9 oz. HPM Injection molding machine Hydro-Power. Oil Heated Chamber Power Screw Feed 200 Ton Clamp new 1940. 1—12 oz. HPM—same characteristics as above. Priced for quick sale. STEWART BOLLING & COMPANY, INC. 3190 E. 65th St., Cleveland 27, Ohio.

FOR SALE: Used Electronic Heat Sealing Equipment Generators and Presses for Plastic Sealing. Leading make, Good Condition, Reasonable. Reply Box 619, Modern Plastics.

FOR SALE: Preco Hydraulic Laminating Press. Platinum pressure: 40,000 lbs. Platinum sizes 8½x12. A-1 condition—now in use. BRADEN MFG. CO., 4624 S. Cedar St., Lansing, Michigan.

LESTER Injection Molding Machines for Sale: 4—12 oz. 1—4 oz. Can be seen in operation. Reply Box 621, Modern Plastics.

FOR SALE—ONE 3½" PLASTICS EXTRUDER, completely equipped including adjustable 52" maximum width sheeting die, unused, in original crate—subject to prior sale. MID-STATES GUMMED PAPER COMPANY, 2515 So. Damen Ave., Chicago 8, Ill.

OFFER One Modern 18x42" Farrel Plastic Mill, Complete. Reply Box 616, Modern Plastics.

FOR SALE: (1) #1 Banbury and (1) 6" Allen Strainer. (1) 3¼ Hartig Plastics Extruder. Reply Box 617, Modern Plastics.

MACHINERY and EQUIPMENT WANTED

WANTED: Banbury Mixers, Heavy Duty mixers, Calenders Rubber Rolls & Mixers. Extruders, Grinders & Cutters, Hydraulic Equipment, Rotary and Vacuum Shelf Dryers, Injection Molding Machines. Will consider an operating or shut down plant. P. O. Box 1351, Church Street, New York 8, N. Y.

WANTED: Plant or Machinery including Rubber Mills, Hydraulic presses, Sturdy mixers, Calenders, Banbury mixers, Pulverizers, Grinders, Rotary cutters, Extruders, Screens, Injection Molding machines, Dryers. CONSOLIDATED PRODUCTS CO. INC., 13-14 Park Row, New York 38, N. Y. BArclay 7-0600.

WANTED: 2 ounce Watson Stillman Vertical Injection Molding Machine. NATIONAL PRECISION CASTING CORP. Berkley St., Clifton Heights, Penna.

WANTED: Plastic injection moulding machines. Get our offer before you sell. ACME MACHINERY & MFG CO., 102 Grove St., Worchester Mass.

MATERIALS FOR SALE

WILL SELL substantially below schedule in original drums 6000 lbs. Carbides Bks 90 Polystyrene Emulsion 5000 lbs. Carbides Plasticizer Two 20000 lbs. Velsicol AB11-2. Reply Box 625, Modern Plastics.

FOR SALE: Several thousand pounds scrap fiberglas two-ounce mat. Scrap section vary in size. Price $.20 lb. f.o.b. La Crosse, Wisconsin. Reply Box 618, Modern Plastics.

SCRAP P.V.C. and other thermoplastics in all forms. MICHAEL S. STEVENS, MERCHANTS Keswick Works, Keswick Road, London, S.W. 15, England.

FOR SALE: 5000 lbs. white rigid Vinylite sheeting—.010"x44"—in unopened containers. Greatly reduced price. Reply Box 643 Modern Plastics.

MATERIALS WANTED

WANTED: PLASTIC SCRAP OR REJECTS in any form. Also surplus and obsolete lots of virgin molding powders. We also custom reprocess your own scrap. A. BAMBERGER CORP., 703 Bedford Ave., Brooklyn 6, N. Y. Telephone: MAin 5-7450.

(*Continued on page 242*)

CLASSIFIED ADVERTISING

(*Continued from page 240*)

WANTED: Plastic Scrap, Rigid Vinyl, Cellulose Acetate, Polystyrene, Polyethylene, Butyrate, Custom grinding, magnetizing, compounding, and straining of contaminated plastics. FRANKLIN JEFFREY CORPORATION, 2004 McDonald Avenue, Brooklyn, N. Y., ES 5-7943.

WANTED: PLASTIC SCRAP or REJECTS in any form: Cellulose Acetate, Butyrate, Polyethylene, Polystyrene, Vinyl, Acrylic, Ethyl Cellulose. Reply Box 628, Modern Plastics.

WANTED: SURPLUS UREA molding powder. Reply Box 631, Modern Plastics.

WANTED: Cellulose Acetate Mixed Gates or Scrap. Any quantity considered. Reply Box 608, Modern Plastics.

WANTED: PLASTIC SCRAP such as Cellulose Acetate, Vinyls, Acrylic, Ethyl Cellulose, Polystyrene, Butyrate, etc. We also buy surplus inventories of molding powder or grind, clean and reprocess your own scrap. CLAUDE P. BAMBERGER, INC., 152 Centre St., Brooklyn 31, N. Y., Tel. MAin 5-5553. Not connected with any other firm or similar name.

PLANTS FOR SALE

FOR SALE
Complete wood flour mill. Capacity 10 tons per 24 hours, using nearby supply of pine and poplar. For further particulars, reply Box 630, Modern Plastics.

FOR SALE: Complete Plastic Mold Tool & Die Shop in N. J. Plant now in operation. Metropolitan Area. Modern Equipment. For further particulars, Reply Box 641, Modern Plastics.

PLANTS WANTED

PLASTICS PLANTS WANTED. Going Business, Volume $300,000 to $3,000,000: Consumer-Proprietory or Industrial Products: We represent a Leading Nat'l Corporation: Seeking Diversification & Expansion into new fields and Territories. Sizeable Investments Preferred: Name of Company on request: Competent and Confidential Dealings. GOLDEN INDUSTRIAL AGENCY, 2189 Gr. Concourse, N. Y. 53.

MOLDS WANTED

MOLD WANTED for injection molding. We will buy one mold or a complete line or series of molds for finished resaleable items. Housewares, toys, novelties, etc. Will also buy molds for industrial parts such as handles, knobs, drawer pulls, gears. All items for resale in U. S. A. Send detailed information to VICTORY MANUFACTURING COMPANY, 1722 W. Arcade Place, Chicago 12, Illinois.

BRUSH MOLDS AND BRUSH MACHINERY—Injection molds for ladies', men's, military, nail, tooth brushes, etc. Send particulars and samples. Reply Box 763, REALSERVICE, 110 W. 34 St., New York, N. Y.

WANTED: 20 ligne ring fisheye button mold. 300 or more cavities. Must be in good working condition to pass moldmakers inspection. Also wanted: a Stokes RD4 rotary tablet machine. Give serial no., condition and punches available. For Sale: a Colton 5½T single punch preform press. Reply Box 611, Modern Plastics.

MOLDS FOR SALE

FOR SALE: Very cheap, 5 injection molds plus a good quantity of components. Molds are for a 5" round compact—a flat cigarette case—a square cigarette box—a piano cigarette box and a 16 cavity mold for midget wind-up cars. Prices and additional information upon request. Box 269, Dept. W, Erie, Pa.

HELP WANTED

PRODUCTION MANAGER OR ENGINEER OR CHEMIST with knowledge of vinyl film printing, embossing and laminating. Must have thorough know-how equipment and operation of vinyl film printing plant. Salary $9,000-$12,000. Reply Box 636, Modern Plastics.

EMULSION POLYMER CHEMIST: Interest aptitude in colloid chemistry and experience in emulsion polymers. New opening in expanding development laboratory in Chicago. Give details of experience, and salary expected. Reply Box 626, Modern Plastics.

EXPERIENCED PLASTICS INDUSTRY SALES REPRESENTATIVE. Large stable Midwest chemical processing company needs services of experienced sales representative in plastic field to contact large national accounts in sale of plasticizers. An unusual opportunity for a capable man to handle these new products. Reply stating background, qualifications and salary expected. Reply Box 606, Modern Plastics.

POLYESTER RESIN—SALES AND TECHNICAL PERSONNEL
Eastern resin manufacturer located in the Metropolitan New York area offers opportunities in sales and development of polyester resins for:

A SALES ENGINEER to organize and head up sales of polyester resins for molding, casting and laminating fields. Should have wide sales development and application experience. Customer contact and plant application experience important.

B DEVELOPMENT CHEMIST—Group leader to head up industrial research group for developing polyester and other resin type polymers. Must have imagination and be capable of independent creative work.

C TECHNICIAN—Must be completely familiar with procedures and techniques of testing polyester resins for molding, laminating and casting fields.

Salary dependent on experience and qualifications. Our employees know of this advertisement. Replies held confidential. Reply Box 613, Modern Plastics.

CHEMIST OR CHEMICAL ENGINEER: Expanding chemical manufacturer in Metropolitan N. Y.-N. J. area has openings for men with one to four years experience in plastics testing and evaluation. Experience in processing, testing, and application of vinyl resins, plasticizers, and/or reinforced polyester resins required. Submit detailed resume of training, industrial experience and salary requirements. Reply Box 627, Modern Plastics.

FOREMAN. To organize and take charge of our extrusion molding department. Must be experienced on different types of machines and materials and modern methods to operate the department efficiently and economically. This is a real opportunity to show skill and ability. Chicago Area location. Salary commensurate with experience. Reply Box 612, Modern Plastics.

WANT TO ADD A PROFITABLE LINE? If you are already selling this field—here's a real opportunity to add a top-profit line of SPECIALTY PAPER BAGS. Big sales potential exists in this trade—buyers are waiting to be sold! Must be top salesman with good contacts. Excellent commission arrangement. Act now! Write, giving references and territory covered or phone EXeter 2-1800. STANDARD BAG CO., 29-10 Hunters Point Ave., Long Island City, N. Y.

PLANT SUPERINTENDENT: We have an excellent opportunity for an experienced injection molding superintendent to manage the night shift of our new modern plant. The man selected will have a permanent position in suburban Chicago, a substantial salary and a real opportunity for further advancement. FEDERAL TOOL CORPORATION, 3600 W. Pratt Blvd. Chicago, Ill.

POLYETHYLENE ENGINEER OR CHEMIST. Background in polyethylene film extrusion and embossing. Well financed company. Replies treated in confidence. Reply Box 635, Modern Plastics.

ATTENTION SALESMEN $ % BIG REWARD % $ HIGH COMMISSIONS PAID. Salesmen wanted full or part time to handle the following plastic items: Fluorescent plastic; ribbon and silkscreened letters. Easy selling stick-on plastic sign kits. Flasher light box; interchangeable stick-on letters. Deep drawn plastic form letters. Come in and introduce yourself! You'll be glad you did. GLO-RITE PLASTICS, 35-07 28th St., Astoria, Long Island. AStoria 4-9478.

PLASTICS ENGINEER. Diversification of extruded Thermoplastic products line by well-established company located New Jersey metropolitan area creates excellent opportunity for man having some experience with rigid vinyls. Primary responsibility will be research and development. Please submit complete resume for prompt and confidential consideration. Reply Box 620, Modern Plastics.

PLASTIC MOLD ENGINEER AND DESIGNER. Experience necessary in both estimating and designing compression and injection molded parts and molds. Applicant must be capable of drawing up molds from design stage through to completion. The opening requires a man with experience and ability to hold down a responsible position in our organization and to follow through and complete assignments given to his department. Salary to be in line with experience and ability. Our plant is located in the Mid-West where opportunities in the Plastic field are unlimited. Write full particulars. Reply Box 640, Modern Plastics.

TECHNICAL SALESMEN WANTED—Position open with large Midwest color manufacturer to head up color sales to the plastics and rubber industries. Must have some experience in the use of color in the plastics and rubber fields. Excellent opportunity for advancement in a new department. Reply Box 629, Modern Plastics.

VINYL CHEMIST
Experienced production heavy and/or thin gauge calendered vinyls. Technical supervision production and quality control. Real opportunity for professional development. Pennsylvania location. Replies confidential. Reply Box 610, Modern Plastics.

PLASTIC MOLDING SUPERVISOR. Well established injection molder in Jersey Metropolitan area has opening for complete charge molding department supervisor. Thorough knowledge of machines and materials required. Permanent position with good salary and bonus. State age, experience, etc., and earnings expected. Reply Box 624, Modern Plastics.

ASSISTANT DAY-SHIFT FOREMAN and set-up man wanted for injection molding plant, located Sturgis, Michigan. Permanent position with large manufacturer, with steady advancement and many other benefits.

Also opening for reliable night shift foreman to take charge of complete shift in injection molding plant.

Write full particulars and past earnings. Reply Box 637, Modern Plastics.

ACRYLIC MOLDING FOREMAN: Progressive eastern company has immediate opening for a general foreman thoroughly experienced in the vacuum forming, cementing, and assembly of acrylic molded parts. Please submit experience record and state salary desired. Reply Box 607, Modern Plastics.

EXPERIENCED PLANT SUPERINTENDENT for fast growing Southern modern injection molding plant. One who is experienced in production procedures as well as compounding of plastic materials preferred. Write full past experience. Reply Box 632, Modern Plastics.

POLYETHYLENE
WANTED—EXPERIENCED TECHNICAL PERSONNEL by rapidly expanding mid-western chemical company now entering polyethylene field. A number of positions, including top administrative posts, are waiting for men of demonstrated ability. Splendid opportunity for recognition. Write to SPENCER CHEMICAL COMPANY, 610 Dwight Bldg., Kansas City, Mo.

SITUATIONS WANTED

PLASTICS EXECUTIVE: Presently Works Manager Plastics Plant (300 employees). Chemical Engineer, 33, with 11 years well-rounded experience in Manufacturing Management, Development, Engineering, and Technical Service. Strong background in Vinyl, Polystyrene, Polyethylene, Extrusion and related operations. Experience in Injection and Compression Molding. Capable administrator and organizer. Desires responsible position in Manufacturing Management. Eastern Location. Reply Box 633, Modern Plastics.

MANUFACTURERS' REPRESENTATIVE: Now affiliated with large producer of custom plastic parts in Michigan, Ohio and Indiana territory. Mechanical engineer with sixteen years sales engineering experience. Would like account with large press and assembly facilities. Reply Box 622, Modern Plastics.

(*Continued on page 244*)

CLASSIFIED ADVERTISING

(Continued from page 242)

CHEMICAL ENGINEER, Ph.D. degree, available for consulting services in plastists technology. Specializing in problems relating to low pressure forming of thermoplasts, glass reinforced plastics, plastisol and organosol formulations. Expert in vacuum forming including automatic equipment design. Successful record of accomplishment in development and production. Reply Box 623, Modern Plastics.

PLASTIC MANUFACTURING SPECIALIST with twenty years of practical on the job experience in all phases of compression-transfer and injection molding, desires to locate company or individuals with available work to invest with him in setting up small hard hitting molding plant. Prefers East or Southeastern U. S. A. Personal and bank references gladly furnished. Reply Box 609, Modern Plastics.

SALES ENGINEER: 13 years plastic sales experience. Knows all phases of injection molding and finishing large and small parts. Also familiar with compression and extrusion. Currently selling most major accounts in Middle West. Seeking exclusive commission arrangement in Chicago area with progressive molder who is equipped for volume injection molding and finishing. Reply Box 615, Modern Plastics.

VACUUM-FORMING THERMOPLASTICS. Knowledgeable and responsible person seeking employment providing scope for development with established firm. Can offer mature know-how in design and production and considerable art background. Experienced model and mold-making towards vacuum forming of thermoplastics for advertising display and allied fields. Experienced in problems of registration to pre-printing. Terms open. Will consider relocation. Reply Box 604, Modern Plastics.

MANUFACTURER'S REPRESENTATIVE, engineer, with plastics experience and extensive industrial following in southern Ohio and Indiana, desires association with custom moulder and decorator. Can offer immediate opportunity to quote on large number of high-volume items required by refrigeration industry in this area. Please do not reply if not prepared to handle considerable business from these companies. H. H. WELLAND, 2619 Fernview Court, Cincinnati 13, Ohio.

SALES ENGINEER—Representative for large plastics materials manufacturer with 12 years successful selling experience to automotive, appliance, and toy fields, desires permanent connection with progressive molder in sales capacity. Looking toward investment opportunity as part of management when capabilities proven. For detailed resume reply Box 642, Modern Plastics.

MISCELLANEOUS

Patent for immediate sale. First answer gets possession. For sale on any terms offering immediate compensation at least in part. Patent number 2,433,792 molded renewable cartridge fuse. Temporary thermosetting single cavity mold included. Extended illness in family forces this to be offered. Sample of temporary mold shows improvement in design over drawings in patent. Reply Box 634, Modern Plastics.

SITUATIONS OPEN: Leading supplier of plastic materials seeks responsible distributors to establish strategically located fabrication shops on an exclusive basis. Licensees would be responsible for sale and fabrication of plastics for fume exhaust systems and acid resistant equipment. Please give full details. Reply Box 601, Modern Plastics.

DETROIT MANUFACTURER'S AGENT Desires compression and Thermo-Plastics type account for Custom Industrial production. Exclusive territory commission basis. E. H. HECK, 3460 Audubon, Detroit 24, Mich.

WANTED—RENT OR PURCHASE Facilities or plant for the Manufacture of Urea-Formaldehyde and Phenol-Formaldehyde Resins. Reply Box 603, Modern Plastics.

PRODUCT DESIGNS (STUDENTS REQUIREMENTS)-INJECTION MOLDING. Australian Product Design Consultant offers original and highly competitive designs to established U. S. firms. These are low cost items designed for world markets. Weights 1/12, 1/6, and 1/4 oz. Economical tooling and molding. Outright sale preferred. Write, CHARLES FUREY, 480 Bourke Street, Melbourne, Australia.

MR. PLASTICS EXTRUDER: Good opportunity for small plant willing to relocate in New England. We have large modern plant in experienced labor market and exceptionally low cost raw materials. Would like to form association. No investment required. Your machinery; our plant and materials. All replies will be acknowledged. Reply Box 638, Modern Plastics.

NOTICE TO THE PLASTIC TRADE:
Mr. Robert Kagan is not in any manner associated with us in business.
AMERICAN PLASTIC CORPORATION
Dave Segal, President
2938 N. Halsted St.
Chicago 14, Illinois

POLYMEROID ENGINEERING, CONSULTANTS. Here is the opportunity for the smaller manufacturer to have the benefits of a technical staff without the expense it entails. We are at liberty to advise on all phases of manufacture from raw material to finished product, including the machinery needed, cost of operation, plans, personnel required, etc. For information reply Box 644, Modern Plastics.

ROTOGRAVURE PRINTING, laminating, finishing on plastic film, sheeting and all types of rigid and non-rigid films. Problems solved. 20" wide machine as pilot plant available. Thoroughly experienced printer and colorist will also undertake to start printing dept. as a complement to your present operations, on a salary plus profit sharing basis. Reply Box 639, Modern Plastics.

All classified advertisements payable in advance of publication
Closing date: 28th of the second preceding month; e.g., May 28th for July issue.

Up to 60 words $10.00	Up to 120 words $20.00	Up to 180 words $30.00
Up to 60 words (boxed) $20.00	Up to 120 words (boxed) $40.00	Up to 180 words (boxed) $60.00

For further information address Classified Advertising Department,
Modern Plastics, 575 Madison Avenue, N. Y. 22, N. Y.

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TINNERMAN Speed Nut SAVINGS STORIES

alliance TENNA-ROTOR "TURNS" TO TINNERMAN

...BEAMS-IN 50% ASSEMBLY SAVINGS!

Engineers at Alliance Manufacturing Company, Alliance, Ohio, knew from experience how SPEED NUT brand fasteners change fastening problems into production savings. That's why they "turned" to Tinnerman for a clear savings picture in designing the Tenna-Rotor! Push-On SPEED NUTS were selected right from the Tinnerman catalog for tremendous time and engineering savings at the design stage! 16 Push-Ons, zipped over integrally molded studs, attach the electronic mechanism to the plastic control panel and box! They eliminated metal inserts, nuts, and lockwashers – reduced materials handling – stepped-up production, and netted a 50% savings in assembly costs.

A call will bring your Tinnerman representative with complete, detailed information to help solve your fastening problems . . . and maybe find savings like this!

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. . . zip over integral studs, rivets, tubing, or other unthreaded parts; bite into smoothest, hardest surfaces — lock with firm spring tension on metal, plastic or wood. Eliminate costly inserts in plastics; save machining of die castings!

Write today for your copy of SPEED NUT "Savings Stories" a booklet of amazing examples of Tinnerman savings to industry:

TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fastenrs, Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A. – 7 rue Henri Barbusse, Levallois (Seine).

TINNERMAN Speed Nuts®

MORE THAN 8000 SHAPES AND SIZES

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MODERN PLASTICS

575 MADISON AVENUE • NEW YORK 22, N.Y.

WMP-Moulded Grips Help These Regal Ski Poles Get a ROYAL Buying Reception!

Here's further proof of the way WMP literally moulds "buy appeal" — and functional utility — right into the manufacturer's product. These handsome red polyethylene grips for Lund Regal Ski Poles are as attractive as they are rugged. The unique ribbed design gives skiers a secure, comfortable grasp. Buying appeal features like these are typical of scores of parts and products regularly custom moulded by WMP.

Let WMP give your plastics moulding requirements the same expert attention — the benefit of large-capacity moulding and metallizing facilities — and the experience of WMP's years of custom moulding. Write us today about your particular needs — or better still, let us fly you to Worcester so you can see at firsthand our plant facilities and talk with a member of our engineering staff.

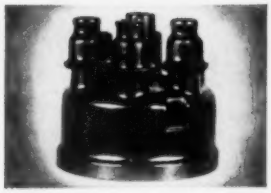
Courtesy C. A. Lund & Co.
Laconia, New Hampshire

WMP

Custom Injection Moulding

WORCESTER MOULDED PLASTICS CO.

14 HYGEIA STREET, WORCESTER 8, MASS.



Keep Up-To-Date on VINYLITE RESINS and PLASTICS!

Send for Your Copy Today

It's new, *completely up-to-date*—a fully illustrated booklet packed with technical data on VINYLITE Resins and Plastics for extrusion and molding. It will help you in the design and manufacture of parts and products produced from rigid or elastomeric molding and extrusion compounds. You'll value it as a reference book for such features as the section titled "Suggestions for the Design Engineer," or the "Average Properties Tables." Black and white and full-color photographs show typical applications.

VINYLITE Plastic *elastomeric* extrusion and molding compounds stay flexible at –67 deg. F. . . . hold their toughness, resist deformation in temperatures as high as 140 deg. F. These compounds provide smooth, glossy surfaces that can be embossed and printed. Colors—stock, made-to-order or specially matched—have excellent stability, will not bleed. VINYLITE *rigid* extrusion and molding compounds make it possible to fabricate products of sharp detail, with close tolerances. Finish is smooth . . . mold shrinkage low. *All* VINYLITE Plastics have excellent resistance to moisture, mildew, abrasion, oils, greases, alkalies, most strong acids, sunlight, flame and age. They are dimensionally stable, light and strong, offer good electrical characteristics . . . can be compounded in any color—transparent, translucent or opaque.

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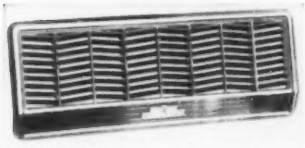

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UNDERSEA cable wires with BAKELITE Polyethylene covering for excellent electrical properties, flexibility, light weight. Jackets of black VINYLITE Resins protect against abrasion, water. By Ansonia Wire & Cable Co., Ansonia, Conn.

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